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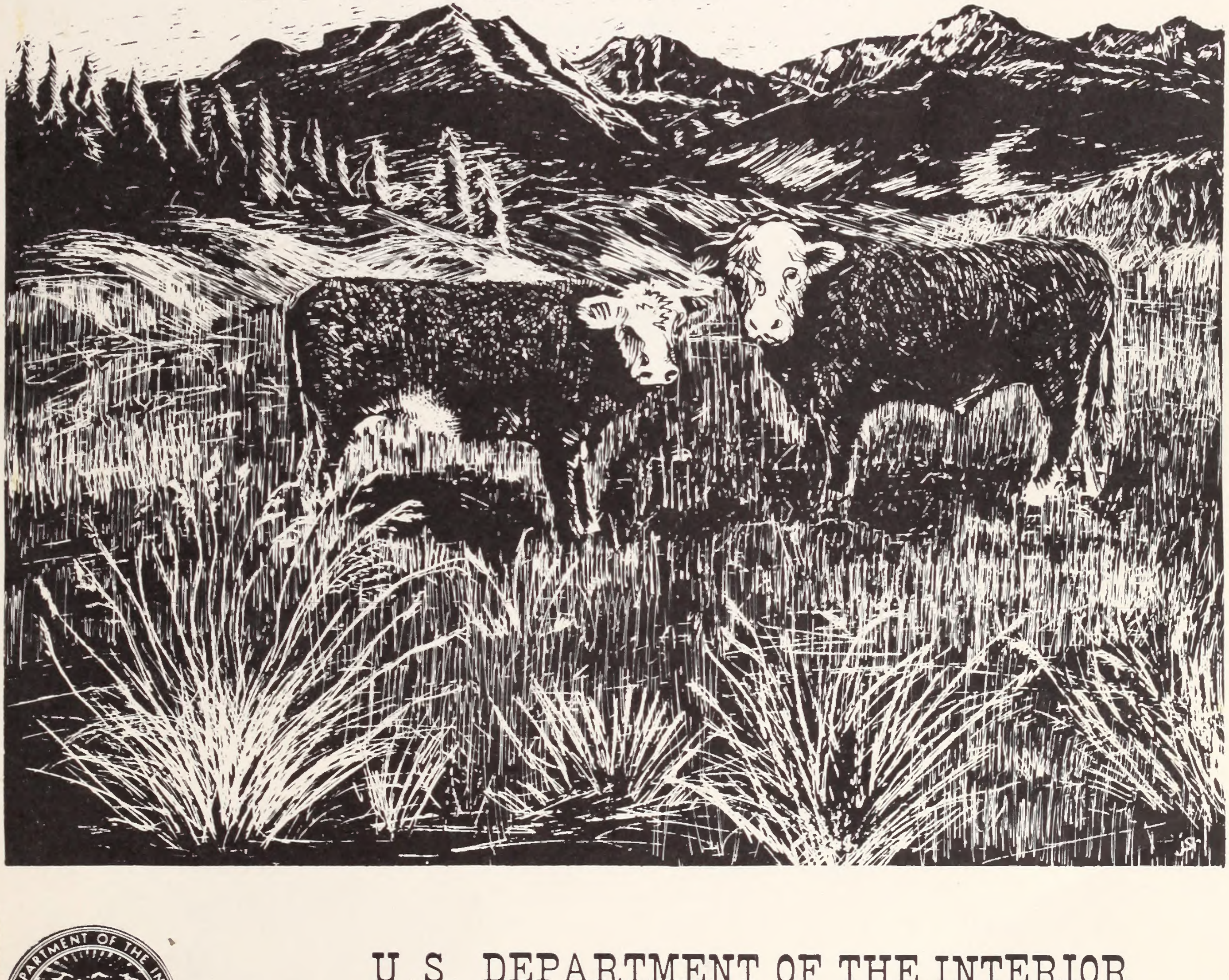

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PROPOSED DOMESTIC LIVESTOCK GRAZING MANAGEMENT PROGRAM IN THE GUNNISON BASIN RESOURCE AREA AND SILVERTON PLANNING UNIT

MONTROSE DISTRICT, COLORADO

Prepared by

Bureau of Land Management
Department of the Interior

Dale R Andrus
State Director
Colorado State Office

Abstract: This environmental impact statement considers a proposed action and five alternative proposals for domestic livestock grazing management on 637,277 acres of public land administered by the Bureau of Land Management in southwestern Colorado. The proposals analyze and compare different levels of livestock and wildlife vegetation allocations, methods and periods of livestock use, and rangeland improvements. The overall objective of the rangeland program is to provide multiple use management for all resources within the capacity of the total resource base.

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SUMMARY

The Bureau of Land Management proposes to implement an improved livestock grazing management program in the Gunnison Basin and American Flats/Silverton Planning Units of the Montrose District in southwestern Colorado. The area includes approximately 637,277 acres of public land and 167 livestock grazing allotments. Five alternatives and the proposed action were assessed: (1) MFP Step II/Spring Rest (proposed action); (2) Fall Rest; (3) No Action; (4) Elimination of Livestock Grazing; (5) Optimize Wildlife and Watershed Values; and (6) Optimize Livestock Grazing.

1. MFP Step II/Spring Rest. The major components of this alternative would be:

   a. Set initial livestock grazing allocations at 44,542 AUMs (a 26 percent reduction in existing livestock grazing allocations).

   b. Implement grazing systems centered around the spring rest requirement of forage plants.

   c. Construct various range improvements including 97,090 acres of vegetation treatments necessary to implement livestock grazing systems.

This alternative would reduce livestock allocation and ranch income by 15,471 AUMs (26 percent) and $1,105,000/year, respectively, in the short term (during implementation, 1985). In the long term (2005) vegetation cover and production would increase (by 11 percent basal and 217 pounds/acre/year, respectively). Also, long-term vegetation condition would improve (an additional 170,526 acres in good condition and 439 acres in excellent condition).

The improvements in vegetation would lead to long term reductions in runoff by a total volume of 49 acre feet over a 6 month grazing season and sediment by 30 percent. Total erosion in the area would be reduced by 359,663 tons/year and soil compaction by 16 percent. Good condition aquatic habitat would increase (by 24.6 miles).

The long-term vegetation improvements could lead to long-term increases (from the present) in livestock vegetation allocations (by 3,188 AUMs) and wildlife use (by 12,386 AUMs). These increases, in turn, could result in long-term increases in ranch income (by $222,600/year) and recreation use (by 19,250 hunting days). The cost of implementing this alternative would be approximately $3,452,900.

2. Fall Rest. The major components of this alternative would be identical to the MFP Step II/Spring Rest Alternative except the implementation of the livestock grazing systems would be centered around the carbohydrate production and storage requirements of the forage plants.

This alternative would also reduce livestock allocations by 15,471 AUMs and ranch income by $1,105,000/year in the short term. The impacts caused by this alternative would be similar to those under the MFP Step II/Spring Rest Alternative.

The major difference under this alternative would be the long-term vegetation response. In the long term, vegetation cover and production would increase (by 13 percent basal and 312 pounds/acre/year, respectively). Also, long-term vegetation condition would improve (an additional 189,258 acres in good condition and 439 acres in excellent condition). The slightly better vegetation response (compared to the Spring Rest Alternative) could lead to slight, unquantifiable decreases in erosion rates and surface runoff. Good condition aquatic habitat would increase (by 34 miles). The long-term vegetation improvements could lead to long-term increases (from the present) in livestock vegetation allocations (by 11,357 AUMs) and wildlife use (by 18,658 AUMs). These increases, in turn, could result in long term increases in ranch income (by $838,100/year) and recreation use (by 19,250 hunting days).

The cost of implementing this alternative would be the same as the MFP Step II/Spring Rest Alternative.

3. No Action. This alternative assesses the impacts of continuing rangeland management practices as they presently exist.

In the short term, no significant changes would occur; however, in the long term, the present range sites in a declining trend would continue to decline. In the long term, vegetation condition and production would decline (a loss of 32,496 acres presently in good condition and a loss of 51 pounds/acre/year, respectively). The decline in vegetation would cause slight increases in erosion and surface runoff.

In the long term, livestock vegetation allocations and therefore ranch income would remain the same. However, wildlife use would decline (by 3,558 AUMs). Also, 30.2 miles of excellent condition aquatic habitat and 26.5 miles of good condition habitat would be lost. Due to the decreases in big game animals, recreation use would decrease (by 16,577 hunting use days).

4. Elimination of Livestock Grazing. The major components of this alternative would be:

   a. The complete elimination of livestock grazing from public lands administered by the Bureau of Land Management within the Gunnison Basin EIS area (60,013 AUMs).

   b. All vegetation allocations would be used to benefit watershed, wildlife, recreation, and other values.

   c. Approximately 34,824 acres would receive vegetation treatment, designed to benefit watershed and wildlife.

This alternative would eliminate all livestock grazing on public lands within the EIS area. This could cause some livestock operations to go out of business while others, who are less dependent on public land for livestock grazing, could have to reduce operations or provide livestock forage through additional private land or increase supplemental feeding. This would result in a short and long-term reduction of $5,950,000/year in ranch income and a short and long-term decrease in the capital value of the ranches by $18,003,000.

In the long term, vegetation cover and production would increase (by 18 percent basal and 347 pounds/acre/year, respectively). Also, long-term vegetation condition would improve (an additional 207,524 acres in good condition and 47,756 acres in excellent condition).

The improvements in vegetation would lead to long-term reductions in runoff by a total volume of 105 acre feet over a 6 month grazing season and sediment by 66 percent. Total erosion in the area would be reduced by 629,410 tons/year and soil compaction by 33 percent. Good and excellent aquatic habitat would increase (by 28.4 miles and 26.5 miles, respectively).

In the long term, wildlife vegetation use would increase by 60,707 AUMs, and recreation use would increase by 45,023 big game hunting days.

The cost to implement this alternative would be approximately $474,000. This cost includes only the cost of constructing watershed and wildlife improvements and does not reflect the addional cost imposed upon livestock operators.

5. Optimize Wildlife and Watershed Values. The major components of this alternative would be:

   a. Allocate initial livestock grazing use at 20,745 AUMs (a 66 percent reduction in existing livestock grazing use and a 53 percent reduction over the proposed action).

   b. Implement grazing systems centered around the spring rest requirements of the forage plants.

   c. Construct various rangeland improvements, including 111,458 acres of vegetation treatment, necessary to implement the livestock grazing systems.

This alternative would reduce livestock allocations by 39,268 AUMs and reduce ranch income by $3,101,000/year in the short term. In the long term, vegetation cover and production would increase (by 18 percent basal and 366 pounds/acre/year, respectively). Also, long-term vegetation condition would improve (an additional 230,295 acres in good condition and 27,750 acres in excellent condition).

The improvements in vegetation would lead to long term reductions in runoff by a total volume of 72 acre feet over a 6 month grazing season and sediment by 52 percent. Total erosion in the area would be reduced by 539,494 tons/year and soil compaction by 26 percent. Good and excellent condition aquatic habitat would increase (by 66.2 miles and 7.6 miles, respectively).

The long-term vegetation improvements could lead to long-term increases in livestock vegetation allocations (by 14,658 AUMs--the total then allocated to livestock would be 35,403 AUMs, 24,610 AUMs less than present allocations).

With the increased livestock allocations, ranch income could be increased by $1,293,100. Long-term wildlife use would increase (by 62,836 AUMs) and recreation use would increase (by 45,023 big game hunting days). The cost to implement this alternative would be approximately $1,938,000.

6. Optimize Livestock Grazing. The major components of this alternative would be:

    a. Allocate initial livestock grazing use at 61,356 AUMs (a 2 percent increase over existing livestock use).

    b. Implement grazing systems centered around the spring rest requirements of forage plants.

    c. Construct various rangeland improvements, including 201,955 acres of vegetation treatment, necessary to implement livestock grazing systems.

This alternative would increase livestock allocations by 1,343 AUMs and ranch income by $306,000/year in the short term. In the long term, vegetation cover and production would increase (by 10 percent basal and 262 pounds/acre/year, respectively). Also, long-term vegetation condition would improve (an additional 121,584 acres in good condition and 31,790 acres in excellent condition).

The improvements in vegetation would lead to long term reductions in runoff by a total volume of 45 acre feet over a 6 month grazing season and sediment by 26 percent. Total erosion in the area would be reduced by 359,663 tons/year and soil compaction by 17 percent. Aquatic habitat condition would decline (30.2 fewer miles in excellent condition and 39.7 fewer miles in good condition).

The long-term vegetation improvements could lead to long-term increases in livestock vegetation allocations (by 32,376 AUMs) and ranch income (by $2,216,100/year). Long term wildlife use would decline by 9,961 AUMs and recreation use would decline by 39,105 big game hunter days. The cost to implement this alternative would be approximately $4,168,000.

Conclusion

In conclusion, the benefits to all resource values are weighed against the adverse impacts to all resource values in all the alternatives. The MFP/Spring Rest and the Fall Rest alternatives have been shown to have the greatest amount of benefits to all resources for the least amount of adverse impacts. Since the MFP/Spring Rest Alternative has been formulated through the BLM planning system, it is the Bureau's proposed action for the Gunnison Basin EIS area. However, there would be few differences in impacts between the spring rest and fall rest alternatives, so either alternative or a combination of the two would be the preferred course of action.

CHAPTER 1
PURPOSE AND NEED

The purpose of this environmental impact statement (EIS) is to analyze and compare the impacts of alternative rangeland grazing management programs on public lands administered by the Bureau of Land Management (BLM) in the Gunnison Basin and San Juan Resource Areas in southwestern Colorado (Figure 1-1). The objectives of the management programs are to protect and improve the basic soil, water, and vegetation resources in order to enhance the overall rangeland condition. Since implementation of any alternative except no action would be a major federal action that could have a significant effect upon the human environment, the EIS was prepared.

Most of the alternatives considered in this EIS were developed through the BLM planning system, public involvement, and the EIS scoping process. The planning system for the Gunnison Basin Planning Area and the American Flats/Silverton Planning Area was updated in preparation for the EIS, and in the fall of 1978, public meetings were held to determine public concerns in the planning effort.

The unit resource analysis (URA) is the first step in the planning system. In the URA, each specialist inventories the existing resource in considerable detail, and outlines opportunities for enhancement of that resource. The URAs for the Gunnison Basin Planning Area and the American Flats/Silverton Planning Area were updated during 1978-1979 for this EIS effort.

The second step in the planning process is the Management Framework Plan (MFP). Step I of the MFP consists of the resource specialists' recommendations for their resources, approached from a single use point of view. Obviously, many resource recommendations will conflict with recommendations by other resources. During MFP Step II, these resource conflicts are brought forward and resolved using an interdisciplinary approach and compromising uses within the capacity of the total resource base (see Table 1-1). The resulting recommendations are then presented as multiple use recommendations. The MFP Step II recommendations were completed for the Gunnison Basin and American Flats/Silverton areas during the spring of 1979, and a summary of the recommendations was distributed for public review. Public EIS scoping meetings were also held during this period.

Those MFP Step II recommendations which involve the rangeland management program were used to prepare several alternatives for the EIS. Those recommendations not involved with the rangeland program were carried through to the MFP Step III stage. Upon completion of this EIS (August 1980), including the required public hearings and comment periods, the MFP Step III rangeland management decisions will be made. The alternative selected will be implemented at the start of the grazing season following completion of the EIS.

During the MFP Step III stage, the Area Manager and District Manager review the Step II multiple use recommendations and make Step III decisions. These decisions are then reviewed by the State Director. Once the MFP Step III is approved, activity planning can begin to implement the various resource programs.

The EIS area includes approximately 1,062,129 acres, 60 percent of which are public lands administered by BLM (see Map 1--Support Data). Elevations range from 6,000-foot sagebrush hills to 12,000-foot tundra, with pine forests and riparian areas in between. The area is characterized by widely separated small towns; the largest is Gunnison (population 6,000). At present, outdoor recreation (hunting, fishing, camping, sight-seeing, skiing, boating) and domestic livestock grazing are the major industries in the area. Mineral exploration and development have been historic uses in the area and are showing renewed interest.

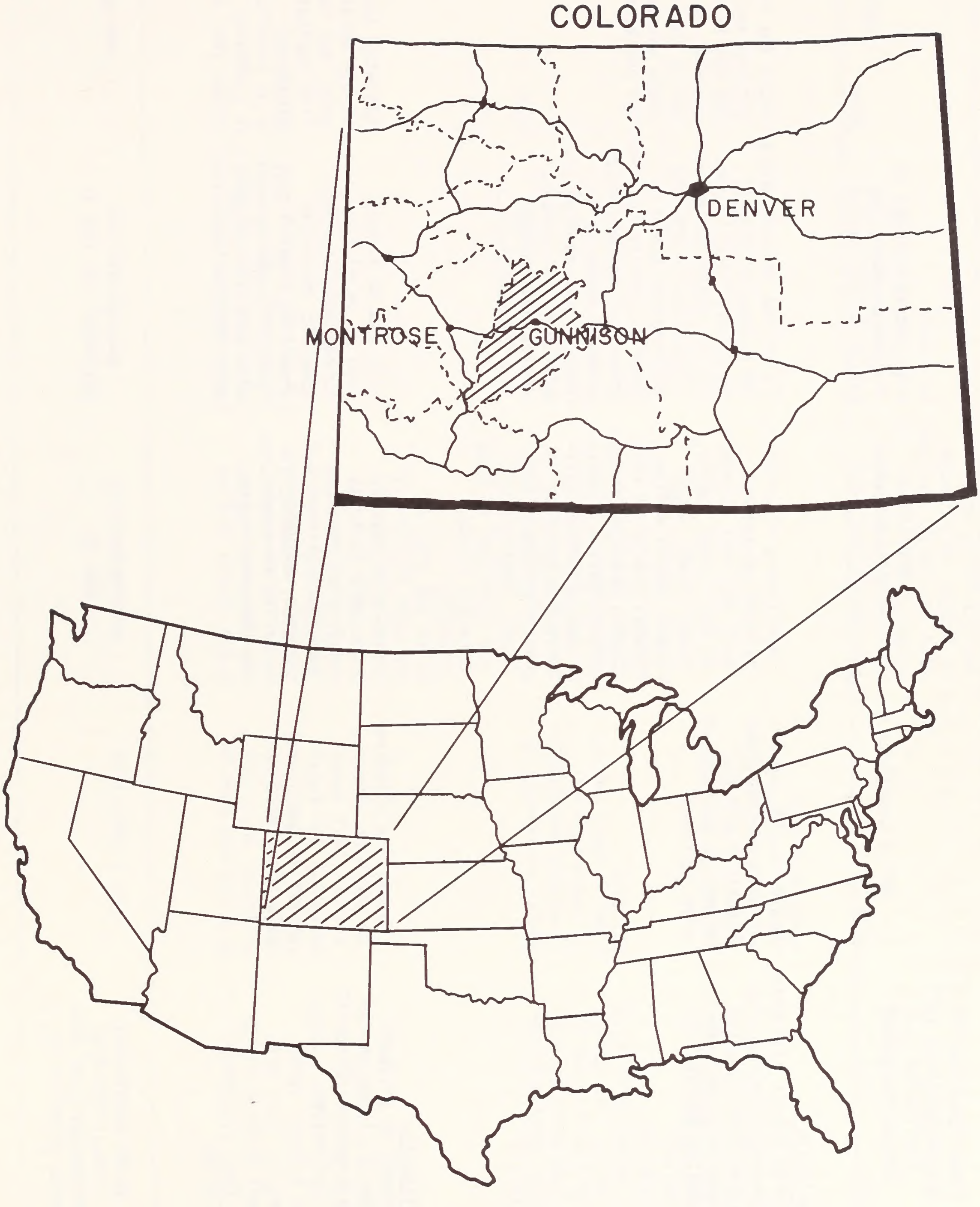

FIGURE 1-1

GUNNISON BASIN LIVESTOCK GRAZING EIS AREA

TABLE 1-1

DEVELOPMENT OF MFP ALTERNATIVES

Livestock MFP I Recommendations	Other Resource MFP I Recommendations that Conflicted with Range Management	MFP I Conflicts	MFP II Recommendations	Rationale for MFP II Recommendations	Trade-Offs
1. Manage the riparian vegetation type on the following creeks as a separate management unit: Rock Creek, East Fork Powderhorn, Trout Creek, Sugar Creek, South Willow Creek, Fourth of July Creek, Spring Creek, Antelope Creek, and West Antelope Creek.	Wildlife Fence and/or eliminate grazing from riparian areas in order to restore or improve habitat for various species.	Would require additional reductions in livestock use and eliminate portions of some pastures.	Institute a riparian pasture management plan and rest schedule on Rock Creek (part), Trout Creek, Sugar Creek, South Willow Creek, Fourth of July Creek, Antelope Creek, and a portion of West Antelope Creek. Eliminate grazing on East Fork Powderhorn Creek, Spring Creek, and a portion of West Antelope Creek.	Extensive fencing would be expensive and not necessary in all cases (e.g., where topography limits use); complete elimination would be very disruptive to livestock use and would not promote multiple resource use; desired riparian goals could be met through proper grazing management.	Goals for riparian maintenance and improvement may not be met as quickly; however, they should eventually be achieved; livestock use would be reduced but not eliminated.
2. On all range vegetative types except timber and alpine tundra, or where human life or property values occur, wildfires will be permitted to let burn if burning occurs between July 30 through May 1. Continue to study and analyze the effects of wildfire management upon the vegetative resource.	Wildlife Browse on southern aspect slopes should be preserved for wildlife habitat.	Controlling wildfire on southern aspect slopes could reduce slightly the total amount of grass available for livestock.	Allow wildfires to burn only in areas where prescriptions have been written and adapted, assuming the specific fire conforms to the prescription.	Fire can be a good tool in vegetation management; however, specific locations should be studied carefully in order to maximize benefits and minimize resource conflicts.	Slightly less livestock forage would be available, but important wildlife habitat would be preserved.

TABLE 1-1

DEVELOPMENT OF MFP ALTERNATIVES
(continued)

Livestock MFP I Recommendations	Other Resource MFP I Recommendations that Conflicted with Range Management	MFP I Conflicts	MFP II Recommendations	Rationale for MFP II Recommendations	Trade-Offs
3. The kind of livestock should be flexible so as to permit grazing by either cattle or sheep, and horses if used in conjunction with the overall livestock operation on all allotments.	Wildlife On some allotments, sheep grazing could conflict with deer and bighorn sheep crucial winter ranges; sheep fences could restrict antelope migrations in some allotments.	Allowing any kind of livestock unit-wide could lead to conflicts in some allotments.	Allow cattle only on some conflict allotments; allow sheep on other conflict allotments only under constraints designed to protect wildlife habitat; on non-conflict allotments, allow any kind of livestock.	Protection of other resource values while permitting flexibility in livestock operations.	Slight loss of flexibility in livestock operations while protecting wildlife habitat.
4. Construct 197 miles of interior and allotment boundary fences.	Wildlife Fences should be designed so as to provide free passage to wildlife, and should not restrict wildlife migrations. Visual Resources Fences should conform with the surrounding landscape character.	Fences necessary for livestock management, if improperly designed, could hamper wildlife. Improperly designed fences could stand out from and conflict with existing landscape character.	Fences should be proposed and designed on an AMP basis, considering BLM specifications, wildlife, visual, and other resource needs.	It is premature to designate exact locations and lengths of fences without developed AMPs to outline needs.	None.
5. Install 215 cattle guards on roads subject to vehicular traffic.	None.	None.	BLM should construct cattle guards on roads identified as necessary for administration of public lands; maintenance would be by agreement, generally whoever had road maintenance responsibility.	Cattle guards should solve some open gate and livestock drift problems.	None.

TABLE 1-1

DEVELOPMENT OF MFP ALTERNATIVES
(continued)

Livestock MFP I Recommendations	Other Resource MFP I Recommendations that Conflicted with Range Management	MFP I Conflicts	MFP II Recommendations	Rationale for MFP II Recommendations	Trade-Offs
6. Develop or construct 303 watering facilities.	Visual Resources Range improvements, including water facilities, should be designed so as not to conflict with the surrounding landscape character.	Improperly designed water facilities could conflict with the existing landscape.	Water facilities should be specified during AMP preparation, following BLM guidelines and with input from all resource specialists.	It is premature to designate exact types and locations of water facilities without developed AMPs to outline needs.	None.
7. Develop grazing systems that will satisfy the minimum spring rest requirement which will accommodate the key forage species on all intensively managed allotments.	Wildlife Livestock use should be eliminated from some allotments or portions of allotments in order to protect or improve habitat for various species. Watershed Livestock use should be limited to 30 percent of key species on some range sites in order to improve site potential and sediment retention.	The wildlife and watershed recommendations would severely impair livestock use and in some areas would make such use impractical.	The minimum rest concept should be accepted on most areas. On an allotment-by-allotment analysis, some turnout dates should be deferred (set later) in order to afford more protection to moist soils and early vegetation.	Elimination of livestock or overly severe reductions would cause unnecessary hardships to operators. The soil and vegetation resources should be adequately protected by the rest schedule and modified turnout dates.	Loss of some livestock use in order to protect and enhance vegetation and soil conditions.
8. Establish periods of use for all non-intensive allotments.	None.	None.	Accept Step I recommendations on allotments where rest schedules were consistent with periods of use; modify non-intensive allotments to be consistent with turnout dates on intensive allotments in the same vicinity.	The periods of use, along with the rest schedules, should ensure protection for the range during critical periods in the early spring growth period.	Loss of some livestock use in order to protect and enhance vegetation and soil conditions.

TABLE 1-1

DEVELOPMENT OF MFP ALTERNATIVES
(continued)

Livestock MFP I Recommendations	Other Resource MFP I Recommendations that Conflicted with Range Management	MFP I Conflicts	MFP II Recommendations	Rationale for MFP II Recommendations	Trade-Offs
9. Initiate allotment management plans on all allotments which have been identified as designated for intensive management and develop non-intensive type (cooperative) plans on those allotments designated as non-intensive management.	None.	None.	Accept Step I recommendation.	Areas with high resource values can be effectively managed intensively; areas for non-intensive management have lower resource values or small amounts of public land.	None.
10. Acquire perpetual exclusive public easements.	Access Some roads recommended in the range recommendation conflict with the district transportation plan. Wildlife Access through some areas would disturb widllife during certain periods of the year; therefore, most non-state, county, or federal highways should be closed.	The access and wildlife recommendations would hinder range management activities to some extent.	Modify Step I recommendations on a road-by-road basis with input by all resource specialists.	Allow multiple-use management while minimizing impacts to individual resources.	The road-by-road recommendations should allow multiple-uses; however, no single use would be optimized at the expense of others.

TABLE 1-1

DEVELOPMENT OF MFP ALTERNATIVES
(continued)

Livestock MFP I Recommendations	Other Resource MFP I Recommendations that Conflicted with Range Management	MFP I Conflicts	MFP II Recommendations	Rationale for MFP II Recommendations	Trade-Offs
11. Dispose of public lands and acquire private lands in areas suitable (e.g., small parcels of public within large areas of private) in order to block up public lands for efficient livestock grazing management.	Lands Land exchanges should take all resource values into consideration, including efficiency of grazing management.	The range recommendation considered only grazing management in proposing land transactions.	Modify Step I recommendation: no private lands will be specified for acquisition; land disposals will be in conformance with lands recommendations, and will take all resource values into consideration.	All resource values must be considered in land transactions.	Slightly less efficiency in range management, but better multiple resource management.
12. Allocate 44,542 AUMs of forage to livestock in the short-term and 80,567 AUMs in the long-term (over 20 years).	Wildlife, Watershed, and Soils Livestock use should be reduced in order to protect and enhance wildlife habitat, watershed quality, and soil erosion resistance.	Within the limited capacity of the resource base, total commitment to one element could adversely affect other elements.	Modify Step I recommendation on an allotment-by-allotment basis to allocate vegetation to all elements within the capacity of the resource base.	Allocations are necessary to ensure multiple use management is carried out in an equitable manner.	No single resource use will predominate, but all should receive a portion of the resource base.
13. Treat 67,386 acres for sagebrush reduction.	Wildlife Sagebrush and other shrub species should be preserved in order to provide sage grouse habitat.	Rejecting all treatments would limit other resource benefits (e.g., livestock, watershed, soils).	Modify Step I recommendation on an allotment-by-allotment basis, using input from all resources.	Recommended treatments as modified, will benefit all resources by providing a stable resource base.	All resources would benefit from the treatments, but none would predominate.

CHAPTER 2

ALTERNATIVES

ALTERNATIVE DESCRIPTIONS

This chapter presents six alternatives in detail: the livestock grazing management program recommended in the MFP with spring rest--(1) Proposed Action; with fall rest--(2) Fall Rest; (3) continuation of present livestock grazing management (no action); (4) elimination of livestock grazing on public lands; (5) optimize wildlife and watershed values; and (6) optimize livestock grazing. Table 2-1 presents a summary comparison of the elements proposed under each alternative. Further detail on these elements may be found in the appendices referenced at appropriate places in the text. A summary comparison of impacts may be found at the end of this chapter.

Livestock Grazing Management Program, MFP/Spring Rest Alternative (Proposed Action)

VEGETATION ALLOCATION

Under this alternative the initial proposed livestock grazing use would be 44,542 animal unit months (AUMs) annually. This would be a 26 percent reduction (15,471 AUMs) in existing livestock grazing use. In addition to the livestock AUMs, the alternative would provide 34,200 AUMs for wildlife, a 5 percent reduction in present use. See Appendix RM-1 for allotment allocations and Appendix RM-2 for methodology used to formulate vegetation allocations.

Potentially allocatable AUMs for the long term (20 years from implementation--year 2005) would be 91,207 AUMs (51,593 livestock; 39,614 wildlife) by management only and 111,728 AUMs (63,201 livestock; 48,527 wildlife) by implementing management and vegetation treatments. See Vegetation section, chapter 4, for a discussion of predicting future vegetation. The potential AUMs shown do not consider overlap between big game and livestock. The allocation of AUMs potentially available in the year 2005 are broken down specifically for the purpose of analysis only. Actual allocations would be adjudicated on land use decisions at that time.

METHOD OF GRAZING

This alternative would allow continued operation of 34 existing allotment management plans (AMPs) (334,982 acres public land; 64,261 acres other lands). Upon implementation of this alternative, 69 additional AMPs would be developed (235,440 acres public land; 45,008 acres other lands). All of the AMPs would be constrained by the spring rest schedule (described later). See Appendix RM-3 for allotment level detail on period and intensity of grazing.

As part of this intensive AMP management, Schedule F, (described under Spring Rest Schedule), has been proposed for Antelope Creek, Trout Creek, Sugar Creek, South Willow Creek, Fourth of July Creek, lower portion of Rock Creek, Alder Creek, Cabin Creek, Big Blue Creek, Indian Creek, Razor Creek, and West Antelope Creek. Specific objectives would be added to the general objectives of the AMP on allotments through which these creeks flow. Means for determining objectives may include: (1) trout, in pounds per acre; (2) streamside cover such as overhanging banks, brush, and debris; (3) average eroded channel width and average water width; (4) percent of total stream as riffles; and (5) percent of total stream as pools and runs (Mehan, Pratts 1978).

Proposed to be eliminated from grazing are Spring Creek, and West Antelope Creek (north one-half mile).

This alternative would eliminate livestock grazing on the East Fork Powderhorn Creek from Burnt Creek to Ten Mile Spring of the Powderhorn AMP allotment (6104), but trailing would be allowed on the East Fork drainage. It would also eliminate livestock grazing from approximately the north half of the Middle Fork/Powderhorn Park pasture. The remainder of the pasture would remain within the allotment (see Map 2--Appendix). The overall reduction for the allotment would be 34 percent, with the largest reduction in the area where livestock/recreation conflicts occur.

On 50 allotments containing small percentages of public land, rugged topography, or other factors that hamper implementation of an overall rangeland management plan, non-intensive livestock grazing management is proposed (24,691 acres public land; 21,456 acres other lands). That is, stocking rates and periods of use would constrain livestock grazing use, but the rest schedule would not be applied.

TABLE 2-1

SUMMARY COMPARISON OF ALTERNATIVE COMPONENTS

Component	MFP/Spring Rest	Fall Rest	Present Situation No-Action	Elimination of Livestock	Optimize Wildlife and Watershed	Optimize Livestock
Vegetation Allocation - Short Term (AUMs)						
Livestock	44,542	44,542	60,013	0	20,745	61,356
Wildlife	34,200	34,200	36,141	57,997	57,997	17,386
Type of Management (Number of Allotments)						
Intensive	103	103	34	0	46	130
Less-Intensive	50	50	121	0	107	36
No Livestock Grazing	13	13	11	166	13	0
Rangeland Management Facilities						
Springs	181	181	63	0	63	181
Fence (miles)	197	197	0	1,000	0	197
Water Pipeline (miles)	39	39	0	0	0	39
Wells	63	63	0	0	0	63
Cattle Guards	215	215	0	350	0	215
Reservoirs	59	59	50	0	50	59
Trails (miles)	48	48	23	0	23	48
Rangeland Improvement Treatments (acres)	97,090	97,090	0	34,824	111,458	201,955

Eleven allotments are presently not allotted to livestock grazing, and would continue in that status (39,898 acres public land). Some of these allotments have been allotted to other resources (wildlife, water source protection), while others have a steep and rocky terrain or are heavily timbered which make them unsuitable for grazing. Two allotments would be eliminated from livestock grazing (840 acres public land), and thirteen allotments are proposed to be combined with seven other allotments. Appendix RM-4 outlines land status by allotment.

Eleven Forest Service-Bureau of Land Management cooperative grazing plans would continue. It is anticipated that approximately 33 additional plans would be developed under this alternative (see Appendix RM-5).

SPRING REST SCHEDULE

The proposed spring rest schedule is an abstract of several research papers and technical articles concerning the effects of livestock grazing on vegetation (see Appendix RM-6 for synopsis of research).

Basically, research has shown three critical periods in the growth of perennial grass plants during which grasslands would benefit from rest (Scott 1955). They are:

1. Spring, when plants are drawing on their stored reserves;
2. Summer, when most of the plants are flowering and producing seed; and
3. Autumn, when carbohydrates are transported to the stem bases and roots for storage.

The spring rest schedule establishes the constraints under which grazing would occur. Generally, the earlier grazing occurs the longer the rest period for that specific period used must be.

The following examples explain how the spring rest schedule would affect development of the grazing formula. As outlined in Table 2-2, the grazing period (7/1 to 7/15) does not suggest grazing has to occur for that period only. It means grazing from 7/1 though 7/15 requires the restriction of 3 years rest from grazing during the period 7/1 through 7/15 only.

As shown in example 1, a range user may wish to graze his livestock from 7/13 to 8/15. He would have to rest the pasture for 3 years from 7/1 to 7/15 for each year grazed, but may come back to the same pasture on 7/16 and graze through 8/15 the following year. The third year he would have to rest the pasture from 7/1 to 7/31, but could come back on 8/1 and graze through 8/15. The fourth year he would have to rest the entire pasture through 8/15, but may graze the pasture from 8/15 on. Also, every year, if the vegetation is available, he may graze the pasture after 8/15. Examples 2 and 3 outline other possible use periods. Table 2-3 outlines the basic minimum constraints for Schedule G.

In examples 1, 2, and 3, the range would be in the following stages of plant growth during the defined periods:

7/1 to 7/15	Early growth
7/16 to 7/31	Flowering
8/1 to 8/14	Seed ripe
8/15 on	Seed dissemination and dormancy

The separate spring rest schedules outlined (Table 2-4) vary according to key forage species for plant phenology, climate, topography, elevation of the allotment, and area locality. The spring rest schedule would not restrict the AMP developer to any predetermined livestock grazing system. Development of the grazing system would first take the needs of the key forage plants into account in order to meet the objectives of the AMP and devise the minimum rest these plants require to produce both shoot and root growth. Secondly, the needs of the range user, wildlife, watershed, and other resources would have to be incorporated into the spring rest schedule and a balanced livestock grazing program initiated. Once the schedule is selected it would need to be followed through one complete cycle (up to 5 years). Upon completion of one cycle, the schedule would recycle to year 1 if data from studies showed the objectives of the AMP were being met. If not, the schedule would be changed to meet the objectives.

PERIOD OF USE

AMPs would include establishment of livestock grazing systems which would insure the proposed spring rest schedule for the specific allotment or riparian zone are met (see Table 2-4 for proposed spring rest schedules). The AMPs would also propose range improvements designed to meet identified resource objectives. The type of grazing, location, and total grazing season within each allotment may change due to the flexibility of the proposed spring rest schedule.

Less intensive management on non-AMP areas would include grazing permits specifying the numbers of animals to be grazed, the periods of use, actual use, and any other terms and conditions

TABLE 2-2

EXAMPLES OF USING ONE SPRING REST SCHEDULE

SCHEDULE G

Graze Period	Yrs. Minimum Rest Required/Yrs. Grazed
7/1-7/15	3/1
7/16-7/31	2/1
8/1-8/15	1/1
8/16-On	No Minimum Rest Required

EXAMPLE #1: GRAZE 7/13 to 8/15

Year	7/1 to 7/15	7/16 to 7/31	8/1 to 8/15	8/16 ON
1	///	///	///	
2		///	///	
3			///	
4				

/// = Graze

EXAMPLE #2: GRAZE 8/10 to 12/30

Year	7/1 to 7/15	7/16 to 7/31	8/1 to 8/15	8/16 ON
1			///	///
2				///
3			///	///
4				///
5			///	///
6				///

/// = Graze

EXAMPLE #3: GRAZE 8/20 to 12/30

Year	7/1 to 7/15	7/16 to 7/31	8/1 to 8/15	8/16 ON
1				///
2				///
3				///
4				///
5				///
6				///

/// = Graze

TABLE 2-3

MINIMUM SPRING REST/GRAZE PERIOD

Line	7/1	7/16	8/1	8/16	End	Years Minimum Rest Required/ Years Grazed
A	///	///	///	///	///	3/1
B		///	///	///	///	2/1
C			///	///	///	1/1
D				///	///	0/1
E	///	///				1/1
F	///	///	///			2/1
G	///	///	///	///	///	3/1

/// Graze
Line A Graze 7/1-On
7/1 - 7/15 Rest three years for each year grazed.
7/16 - 7/31 Rest two years for two years grazed.
8/1 - 8/15 Rest one year for three years grazed.
8/16 - On No minimum rest required.
Line B Graze 7/16 - On
7/16 - 7/31 Rest two years for each year grazed.
8/1 - 8/15 Rest one year for two years grazed.
8/16 - On No minimum rest required.
Line C Graze 8/1 - On
8/1 - 8/15 Rest one year for each year grazed.
8/16 - On No minimum rest required.
Line D Graze 8/16 - On No minimum rest required.
Line E Graze 7/1 - 7/16 Rest one year for each year grazed.
Line F Graze 7/1 - 7/31
7/1 - 7/15 Rest two years for each year grazed.
7/16 - 7/31 Rest one year for each year grazed.
Line G Graze 7/1 - On
7/1 - 7/15 Rest three years for each year grazed.
7/16 - 7/31 Rest two years for two year grazed.
8/1 - 8/15 Rest one year for three years grazed.
8/16 - On No minimum rest required.

TABLE 2-4

PROPOSED GRAZING SCHEDULES (SPRING REST)

Graze Period	Minimum Rest Requirement/Years Grazed
	Schedule A
5/01-5/09	3 / 1
5/10-6/14	2 / 1
6/15-7/31	1 / 1
8/01- on	No Minimum Rest Required
	Schedule B
5/15-5/31	3 / 1
6/01-6/30	2 / 1
7/01-8/15	1 / 1
8/16- on	No Minimum Rest Required
	Schedule C
6/01-6/14	3 / 1
6/15-6-30	2 / 1
7/01-7/31	1 / 1
8/01- on	No Minimum Rest Required
	Schedule D
6/15-7/14	2 / 1
7/15-7/31	1 / 1
8/01- on	No Minimum Rest Required
	Schedule E
7/01-7/14	2 / 1
7/15-8/15	1 / 1
8/16- on	No Minimum Rest Required
	Schedule F
5/15-6/14	4 / 1
6/15-6/30	3 / 1
7/01-7/31	2 / 1
8/01-8/30	1 / 1
9/01- on	No Minimum Rest Required
	Schedule G
7/01-7/15	3 / 1
7/16-7/31	2 / 1
8/01-8/15	1 / 1
8/16- on	No Minimum Rest Required

For Allotment 6503 the following grazing schedules are recommended:

Graze Period	Minimum Rest Requirement/Years Grazed
	Schedule H
6/01-6/15	4 / 1
6/16-6/30	3 / 1
7/01-7/15	2 / 1
7/16-7/31	1 / 1
8/01- on	No Minimum Rest Required
	Schedule I
6/15-6/30	4 / 1
7/01-7/15	3 / 1
7/16-7/31	2 / 1
8/01-8/30	1 / 1
9/01- on	No Minimum Rest Required

deemed appropriate by the Secretary of the Interior for management of the public lands.

UTILIZATION

Under this alternative the degree of annual herbage removal would be no greater than that recommended in the proper use table (see Appendix RM-2). Stoddard, Smith, and Box (1975) stated that much heavier utilization can be made of a species without injury in fall and winter than in spring and summer. It is possible to utilize browse species on winter ranges 70 to 80 percent (Smith and Arness 1962). Trilica (personal communication 1979) stated it is possible to utilize a maximum of 60 percent of current height during early growth stages of cool season grass species without detriment to grazed grass specie. Cook (n.d.) determined that early spring grazing above 30 percent of total annual yield would be detrimental to the plant. Under this alternative, utilization would not exceed 60 percent of the amount of vegetation present during early spring growth, and herbage removal would be no greater than that recommended in the proper use table for annual growth.

The key species have not been determined for each allotment, but upon development of the AMPs and grazing systems rangeland managers may select the key species from a table of key species by range site (see Appendix RM-2). The key species may vary from range site to range site within allotments.

Criteria for determining key species would include: (1) big game crucial winter range; (2) rare or endangered plant sites; (3) big game calving or fawning habitat; (4) fisheries; (5) big game summer range; (6) season of use by livestock; (7) kind of livestock; (8) season; (9) upland game habitat; and (10) other resource values. The overall determination of key species would be based upon the opportunities of meeting the objectives of the land use plan.

RANGELAND IMPROVEMENTS

Treatments

A maximum of 97,090 acres would be treated under this alternative (see Table 2-1 and Appendix RM-7). Treatments would consist of aerial chemical spraying, burning, contour furrowing, plowing, seeding, or other types of mechanical treatment to reduce sagebrush composition and increase water infiltration rates. Vegetation manipulation techniques are described here only as possibilities of achieving the desired vegetation composition. The final method of vegetation manipulation would depend on funds, manpower, responsiveness of vegetation on specific range sites, and cost effectiveness. It is assumed that under this alternative, vegetation manipulation would consist of 15 percent spraying, 15 percent mechanical treatments, and 70 percent prescribed burning. On allotments with less-intensive livestock management, it was recommended in the MFP that no vegetation manipulation be done with Bureau funds. See Map 1 for areas suitable for treatments.

SAGEBRUSH SPRAYING

Within areas of dense stands of sagebrush where competition with sagebrush is limiting or reducing the understory species of grasses and forbs, a program to control sagebrush through the use of 2,4-dichlorophenoxyacetic acid (2,4-D) herbicide is recommended. This proposal is designed to treat 14,500 acres of rangeland which has been invaded by big sagebrush (*Artemisia tridentata*), low sagebrush (*Artemisia arbuscula*), and black sagebrush (*Artemisia nova*). Seven different range sites on 46 allotments would be treated.

No specie of sagebrush would be eradicated by the use of a chemical herbicide. Chemical application to the foliage is considered to be highly successful if 75 percent of the target plants are dead when the project is evaluated 12 months after treatment. Selective treatment by ground applications may kill 90 to 95 percent of the plants treated. The total kill on browse species within crucial big game winter range and sage grouse strutting grounds would be limited to 75 percent.

Lawson (1963) reported a 2 to 4 percent increase in density (ground cover) with an 85 percent kill on sagebrush. He further stated on the Pope Cora Peak spray (Wyoming) that the average total production of two unsprayed plots was only 52 percent of the average of the sprayed plots. Forb densities increased 4.4 percent while grass species increased 2.4 percent. Grass and forb production remains high for 6 to 10 years following treatment, depending on the rate of brush recovery. If the initial treatment is very successful, these areas may not need to be treated again for many (10 to 20) years. However, because of the resistance of sagebrush to control, some form of maintenance treatment is expected to be necessary within 10 to 15 years of the initial treatment (Kearl 1965; Johnson 1965; Johnson and Payne 1968; Johnson 1969; Sneva 1972).

To extend the time until maintenance treatments become necessary, grazing management would be intensively regulated to insure recovery of perennial forage plants on treated areas. Grazing would not be permitted for a minimum of 2 years following control treatments. Therefore, specific grazing systems would be designed to periodically provide rest from grazing to assure the physiological requirements of the dominant forage species are met on each range site. Sagebrush plants would be expected to eventually increase in numbers, even if grazing were not permitted (Heady 1975). Because of variables, such as climate, which affect forage production, these areas would not undergo maintenance retreatments until after watershed and vegetation conditions had been monitored for several years (4 to 8) and an actual decline in production is apparent.

Reduction of sagebrush and an increase in grass have other objectives in addition to providing more vegetation for livestock (Rearl 1965): (1) moisture loss from deep soils would be reduced (Tobler 1968; Sturges 1973); (2) wild animals may be favored with more grass and forbs; and (3) tops of willows and serviceberry may be reduced and sprouts increased, thus improving game habitat (Mueggler 1966; Heady 1975).

Normally, spraying would occur by utilizing a low volatile form of 2,4-D. The spray program would be designed to take into consideration the use of the most effective formulation of 2,4-D, while at the same time utilizing the formulation least toxic to non-target organisms. The rate of application would range from 1 to 2 pounds of 2,4-D per acre, using about 3 to 5 gallons of diesel oil-water emulsion per acre. Spray is usually applied by either fixed-wing aircraft or helicopter. Flagging would be installed throughout the sprayed area to provide for non-spraying of irregular strips or patches. A minimum 75-foot buffer strip would be left untreated on both sides of all drainages containing live streams and/or areas of open water in or adjacent to spraying projects. Spray operations would not be conducted in winds over 7 miles per hour to insure proper placement and to avoid spraying non-target areas.

To be effective, 2,4-D must be applied at a certain phenological growth stage of plants. The sagebrush growth stage in the Gunnison Basin would be between May 1 and June 6 (personal communication Hanson 1979). Characteristics on the ground would be; phlox in flower, Sandberg bluegrass heading, rabbitbrush in bloom, and soil moisture sufficient for additional growth (Heady 1975). Each spraying project would be evaluated for environmental considerations and cleared through the Washington Office on a site-specific basis in accordance with BLM Manuals 7331 and 7411 and applicable cooperative agreements with other federal and state agencies.

SAGEBRUSH BURNING

Under this alternative 70 percent or 68,000 acres would be burned. The objectives would be (Heady 1975): (1) to reduce sagebrush; (2) to produce ash for fertilization; (3) to produce more vegetation for livestock; (4) to increase quality of livestock feed; (5) to reduce hazards from wild fires; and (6) to increase wildlife habitat.

The most common purpose of prescribed burning is to reduce sagebrush. Those sagebrush species recommended for control are non-sprouting. These species may be completely eradicated by a single fire when there is adequate ground fuel of dry grass to carry the fire (Stoddard, Smith, and Box 1975). However, in the Gunnison Basin, eradication is improbable. Although fire causes some reduction in perennial grasses, recovery is rapid without seeding (Stoddard, Smith, and Box 1975). Pechanec and Stewart (1944) found that vegetation production was more than doubled by controlled burning followed by correct grazing. In the absence of grass, seeding is necessary. As with spraying, all ranges would be protected from grazing for 2 years following a burn to allow grasses time to gain in vigor; otherwise reoccupation by sagebrush may be rapid. Also, root-sprouting rabbitbrush may take over.

A single fire, although it may result in desired effects, seldom attains a land-management objective. Prescribed burning is one land management tool to be used on a continuing basis, when necessary, along with other practices, to promote desired vegetational composition and production (Heady 1975). Therefore, it is safe to assume that a retreatment would be required before 2005.

Fire breaks would be established by using natural barriers, clearing, or retardants. After establishment of fire breaks, and during proper weather conditions, fires would be set to burn out the remaining areas. Firefighting equipment would be on the scene at all times during burning operations. Burning would be used only in areas where a prescription has been written and approved.

General parameters for prescribed burning conditions are: fuel moisture stick weight--minimum 2, maximum 8; humidity--minimum 5 percent, maximum 40 percent; wind speed--minimum 10 mph, maximum 28 mph; soil conditions--moisture 2 to 5 inches deep; temperature--minimum 50 degrees F, maximum 95 deegres F; vegetation cover--minimum 15 percent basal; slope--maximum 50 percent; and annual rainfall--8 inches.

Mechanical Treatments

Under this alternative 15 percent or 14,500 acres would be mechanically treated by either contour furrowing, plowing and seeding, chaining, root plowing, and/or rolling chopper. If a sufficient on-site seed source is available no artificial seeding would be needed.

CONTOUR FURROWING

Contour furrowing is used primarily on sites where infiltration is very slow. Most furrowing has been done with an implement similar to the Arcadia Model B contour furrower developed by the Forest Service. This implement uses offset discs to create furrows approximately 20 inches wide and 6 to 10 inches deep on 5-foot centers. Rippers ahead of the discs fracture the soil to a depth of 10 to 15 inches. This implement forms small dams every 15 to 25 feet by dragging and dumping loose soil within the furrows. Another implement used is a lister-furrower with two moldboard plows.

Longevity of furrows largely depends on the effectiveness of the interfurrow dams (Neff 1973), and the undisturbed sod dams created by the lister-furrower are much more durable than the loosely consolidated dams formed by the Arcadia Model B furrower. The contour furrowing recommended would utilize the lister-furrower type of equipment to the fullest extent possible. Seeding of the disturbed area would occur at the time of furrowing.

PLOWING AND SEEDING

Where insufficient desirable forage plants exist, and natural revegetation and intensive grazing management cannot raise or restore ecological range condition to satisfactory levels, artificial seeding may be necessary. The objective of plowing and seeding would be to reduce or eliminate less desirable plant species and increase available vegetation through replacement with more desirable species. In order to remove or reduce the existing vegetation, the identified sites would be plowed or pitted with various types of mechanical equipment and then reseeded to a more desirable species or mixture of species. Depending on the manner in which the seedbed is prepared, seeding may be done by drilling or broadcast seeding. Plowed and seeded land would be limited to no greater than 15 percent slopes to prevent erosion by surface runoff. Where the land to be plowed is not flat, plowing would be done on the contour (BLM Manual 7312). However, if seeding is to be done by helicopter, where the seed bed is not prepared, the upper slope limit of 15 percent may be waived.

CHAINING

Where other means of mechanical treatment are not advisable chaining is a quick method of brush control. Generally, the cost-per-acre is less than any other mechanical method; however, the percent of kill may not be as great as other methods. Chaining reduces the vigor of the brush by pulling out and breaking its base. This does not destroy the grass or forb cover.

A proposed method would be to chain in one direction and rest 6 to 8 months before chaining in the opposite direction. This would increase the percent kill on sagebrush.

To accomplish chaining, two tractors drag a heavy anchor chain between them. Chains may be smooth or modified by welding small lengths of railroad track at right anles to the links, forming teeth on the chain. This results in a higher percent kill. At the same time, it scarifies the soil for better percolation of moisture and prepares a more desirable seed bed.

The chaining technique is only temporary (2 to 6 years) and resprouting would occur. A repeated treatment would be planned.

ROOT PLOWING

A root plow is a heavy U-shaped horizontal blade mounted on a crawler tractor. Plowing depth would be a minimum of 4 inches and a maximum of 18 inches depending on the type of soil and width of blade. The root plow floats in the ground and slices the plant below the earth's surface. Plants must be cut at or below the bud zone or they will resprout. Fins or angled bars welded to the plow base shatter hard-pan and surface crust, this prepares a good seed bed. With hard-pan and surface crust broken, moisture penetrates the soil and reduces runoff and erosion.

Root plowing is economical and highly effective. It has a higher percentage kill than chaining. The greatest advantage is that plants may be selectively plowed. More desirable forage shrub species may be left untouched. Root plowing, as well as other mechanical techniques, would be done in the spring when soil moisture is at its optimum. This would ensure maximum efficiency.

ROLLING CHOPPER

The rolling chopper is used when subsurface growth need not be removed and the chopped vegetative matter can be left on the ground to deteriorate. Besides crushing, chopping, and killing growth, it also scarifies the soil without inverting topsoil. The scarified soil retains runoff, retards erosion, and provides a suitable seed bed.

A rolling chopper is a drum with cutting blades pulled by a crawler type tractor. Like chaining, chopping is only temporary (2 to 6 years) and resprouting would occur. A repeated treatment would be planned.

STANDARD DESIGN FEATURES--TREATMENTS

All vegetation treatments and manipulations would be constrained by standard operating procedures in order to minimize environmental impacts:

1. A February 1975 Memorandum of Understanding between BLM and the Colorado Division of Wildlife concerning the mechanical and chemical alteration of vegetation would be adhered to. This agreement calls for formal planning and coordination for any such treatment to begin at least one year before implementation. It also stipulates the procedures for resolution of disagreements over the size, location, and timing of vegetation treatments.

2. Vegetation manipulation sites would be carefully selected with regard to topography and soil type to minimize soil compaction, increase infiltration, and reduce soil losses.

3. It is assumed that under this alternative one vegetation manipulation treatment would occur on a specific site; however, depending on the type of treatment and the soil a repeated treatment might occur.

4. On areas proposed for sagebrush burning or mechanical treatments, inventories would be conducted to locate prehistoric and historic features prior to implementation. Any significant cultural resources found would be mitigated before the project.

5. The normal operating procedures detailed under Rangeland Improvement Facilities would be adhered to for treatment proposals also.

Facilities

A series of rangeland facilities would be necessary to implement the proposed livestock grazing management program (Table 2-1 and Appendix RM-8). The types of projects proposed include fences (including new fence, fence removal, and fence crossings), cattle guards, stockwater reservoirs, wells, spring developments, water pipelines, stock tanks, and trails.

Specific locations for rangeland facilities improvements will not be addressed in this EIS because of unknown variables such as the number and location required by a specific grazing system or plan. Spring developments would be built on specific sites, but pipelines and troughs could be located or constructed in a different locality once the grazing system is devised. Cattle guards would be constructed across roads, but specific locations could vary with allotment management requirements. Exact fence locations would depend on the method of grazing. See Map 1 for general facility locations.

Included in this alternative are the maximum facilities needed for implementation of the revised and proposed AMPs. Rangeland facilities are designed to provide water for livestock, control movement of livestock, encourage livestock distribution, and enhance use of available vegetation.

FENCES

Approximately 197 miles of new fence construction is proposed. All fences would be constructed to BLM standards. Where fences cross existing roads, either gates or cattle guards would be determined by traffic volumes. Pasture and boundary division fences would be built with barbed wire except on antelope ranges where the bottom strand would be smooth wire to allow for antelope movement. Most fences would be four-strand Type D antelope fences; however, three-strand fences may occasionally be used.

CATTLE GUARDS

Cattle guard development would involve the excavation of a trench, construction of a concrete or treated timber base in the excavation, and placement of a metal grid with openings large enough to deter animals from walking across but close enough to allow vehicles to drive over. Approximately 215 new cattle guards are proposed.

STOCKWATER RESERVOIRS

Stockwater reservoirs would impound water throughout the year for livestock use. Approximately 59 reservoirs are proposed under this alternative. Water storage capacity would average 5 acre-feet.

Construction is usually done by contract. Approximately 1 acre would be disturbed at each site.

WELLS

Development of approximately 63 either vertical or horizontal wells is included in this alternative. In most cases, there would be no need for construction of access roads because equipment would be able to drive across country to the construction site. Except where flowing artesian water is found, various types of pumps would be used to bring water to the surface: windmills, electric pumps, or gas engine pumps. If an electric motor is used to power the pump, an overhead power line is normally built to the well site from the nearest power source. A tank to hold water for livestock would be installed near the well site.

SPRINGS

Development of approximately 181 springs is proposed under the proposed action. In most cases, there would be no need for construction of access roads because equipment would be able to drive across country to the spring development site. A hole of approximately 5 cubic feet is excavated at the spring site. A vertical pipe with horizontal collector lines would be inserted and would function as a collection box. Water would be piped in a small diameter plastic pipe from the box to a watering trough or tank (away from the collection system). For sites where the water seeps from a larger area, the gathering devices would be perforated pipes placed horizontally into the seep area.

An overflow drain pipe would be installed in the stock tank or watering trough to conduct the excess water away from the drinking area. All disturbed areas would be seeded with native grass species. All spring sources would be fenced to prevent compaction by livestock.

PIPELINES

Nearly 39 miles of water pipelines are proposed. The pipelines would carry water from a source (well or spring) to an area where water is not now available. After the pipeline route is surveyed and staked, a pipeline trench is dug with a trenching machine no deeper than 6 feet and no greater than 12 inches in width. The plastic pipe used for the pipeline is generally no greater than 2 inches in diameter. When the pipeline is placed in the trench, the trench is refilled and a berm is mounded over the trench to prevent depressions caused by settlement of the backfill material. After the trench has been filled, the pipeline site is seeded to grasses native to the area or as otherwise specified in the construction specifications. Livestock watering facilities are established at predetermined points along the pipeline. Approximately 14 acres would be disturbed by pipeline construction.

STOCK TANKS

New stockwater tanks are proposed. Stockwater tanks are livestock watering facilities, or troughs, and would be round tanks or rectangular metal or fiberglass boxes of varying sizes. Generally wooden posts partially buried in the ground and a wooden frame around the trough would be used to steady the structure. All stock tanks would be equipped with bird ramps or other devices to prevent the drowning of birds and small mammals. Approximately one-tenth of an acre would be disturbed with each watering tank.

TRAILS

The trails proposed under this alternative would be necessary for livestock movement and rangeland management, although hikers and other recreationist could use them as well. Trail work would consist of upgrading and delineating existing trails or building new trails to promote more efficient livestock management (camp moving, livestock trailing, and grazing administration).

On new trails and existing trails in poor condition, water bars would be constructed using logs or rocks in order to prevent erosion. In areas with steep topography, trails would be routed in a switchback manner.

All trail work would be done by hand labor; no earth moving equipment would be used. No powered hand tools (e.g., chainsaws) would be used in the Powderhorn Primitive Area. The USDA, forest Service publication, *Guide for Mountain Trail Development*, (Rocky Mountain Region) would be followed for trail construction and maintenance.

STANDARD DESIGN FEATURES--FACILITIES

Rangeland facilities are normally constructed by private contractors to BLM's specifications. In addition to detailed engineering specifications for each type of facility, the following general procedures apply to all projects.

1. No unnecessary ground disturbance (excavation, road construction, vegetation removal) would be allowed without approval by the District Manager.

2. For rangeland projects that require soil disturbance such as reservoirs, topsoil would be stockpiled and replaced when the project is completed. Revegetation of all disturbed areas is done with native grasses or as environmental conditions necessitate.

3. Public and private roads damaged by the contractor would be restored at contractor expense.

4. All access construction would be accomplished with due regard for environmental considerations. Cut slopes and fill slopes would be no steeper than 3:1 in all soils other than rock unless otherwise specified. After designated sections of the access or haul roads are no longer needed for construction or traffic purposes, the ditches would be filled and the roadway rough graded to restore approximately the original contour of the ground, or to produce a pleasing appearance by forming natural, rounded slopes. After the rough grading is completed, the access road would be scarified or plowed and then harrowed. The cut and fill slopes and roadbed would be smoothed and seeded with a cover of grasses native to the area or known to grow in the area or as otherwise determined to be environmentally acceptable.

5. The contractor would be responsible for complying with all applicable state air pollution control rules and regulations.

6. The contractor would take sufficient precautions to prevent pollution of already existing streams, lakes, or reservoirs encountered during the project development.

7. Erosion control features would be constructed concurrently with other work. The District Manager maintains the authority to limit the surface area of erodible earth material exposed by clearing and grubbing, excavation, borrow, and embankment operations in progress commensurate with the contractor's capability and progress in completing the finish grading, mulching, seeding, and other such permanent erosion control measures.

8. The areas where ground is disturbed by rangeland projects would be inventoried to locate prehistoric and historic features before construction of the improvement. Any significant cultural resources found would be mitigated before the project begins. If buried cultural remains were encountered during construction, the operator would temporarily discontinue construction and notify the BLM. These measures are required to comply with the Antiquities Act of 1906, the Historic Preservation Act of 1966, the National Environmental Policy Act of 1969, and Executive Order 11593 (1971). In summary, the measures require identification of prehistoric and historic sites, the nomination of eligible sites to the National Register of Historic Places, and considerations of those sites in the planning process.

9. No action would be taken by BLM that would jeopardize the continued existence of any federally listed threatened or endangered plant or animal species. A survey of potential habitats for the endangered black-footed ferret must be made prior to making a decision to take any action prescribed in this document that could affect this species. BLM would also comply with any state laws applying to animal or plant species identified by the state as being threatened or endangered (in addition to the federally listed species). If the potentially threatened plant species *Senecio porteri, Stellaria irrigua, Arabis gunnisoniana,* and *Astragalus microcymbus* are found in the area of construction or vegetation treatment, all rangeland improvement projects would be designed to avoid them. Further, grazing systems would be adjusted to fit the needs of the species.

10. A reconnaissance survey of proposed rangeland improvement sites for the likelihood of uncovering scientifically significant fossils would be made only under the following conditions: (1) the proposed improvement site is located in a known scientifically significant fossils collecting area, (2) the proposed improvement site is located in a rock formation known to contain abundant number of scientifically significant fossils, and (3) the proposed improvement is located in an area known to contain prehistoric kill sites.

11. Reseeding would be done by drilling wherever feasible.

KIND OF LIVESTOCK

Under this alternative, the kind of livestock (sheep, cattle, or horses) would remain the same as presently permitted on all allotments. Any requests for changes in kind of livestock would be handled under the Bureau's environmental assessment process. Guidelines for determining change in kind of livestock include: weight of animal, class of livestock (cow/calf, yearling, ewes, etc.), composition and density of vegetation, time or season of grazing, topography (suitability), etc. The proposed allocation of AUMs for this alternative has been calculated for the present kind of livestock, and specific range sites.

SUPERVISION AND MONITORING

Numerous measures, procedures, or design features are integral parts of livestock grazing system implementation and administration. Many of these items would reduce the potential adverse environmental impacts which could result from this alternative. Some of the more significant items are presented in the following discussion (BLM Manual 4413).

1. All AMPs would receive necessary supervision to insure that the grazing formula is followed and timely remedial action is taken to protect the resource base if the grazing formula needs modification.

2. Each AMP allotment would be evaluated at least once during each grazing cycle to determine any changes in plant and soil conditions. Livestock grazing systems would be adjusted when it has been determined that objectives are not being met.

3. Permittees would keep records of actual livestock use on forms furnished by the BLM and would submit these forms to the Area Manager within 15 days after termination of the grazing season. Spot checks would periodically be made on the stocking rate by BLM employees to insure the rangeland is not stocked beyond the grazing capacity.

4. Permanent rangeland trend plots would be established on all AMP allotments in each pasture prior to implementation of the grazing system. Photo trend plots, pace and belt line transects, infrared photography, and frequency analysis sampling are only examples of procedures that would be used to document changes in ground cover, plant vigor, and species composition. Trend plots are essential in determining the workability of a livestock grazing management system, and they provide documented evidence on which to base future adjustments.

5. Within 3 years following the MFP Step III decisions, adjustments in AUMs to this alternative may occur. If studies (actual use, utilization, and trend) indicate that grazing capacities differ from those set in the proposed action, adjustments either up or down would be made consistent with the studies' evaluated results (BLM Manual 4110.3-2(c); IM 79-24, 10/13/78; and IM CO 79-234, 4/30/79).

6. Maximum livestock numbers allowed and period of use would be specified in all AMPs, i.e., AUMs allowed in any given year would not exceed the specified flexibility. Total allowable flexibility would not exceed 15 percent above the recognized grazing capacity if allotments are in good or excellent condition; no flexibility would be allowed above the maximum livestock numbers on allotments that are in poor or fair condition. Accurate livestock numbers and period of use are essential, along with rangeland trend study data, to determine if objectives are being met or what changes may be necessary.

7. Temporary livestock reductions would be made when vegetation conditions are below average productivity. Temporary non-renewable licenses may be issued on better than average years of vegetation productivity. This would insure that overstocking would not occur during years of poor production and would allow reasonable increases in use for better than average years.

8. During the first cycle of the livestock grazing system, the average actual grazing use would not exceed the recognized grazing capacity. Any use above the flexibility provision (not in excess of 15 percent) would be through a temporary non-renewable license with a supporting Environmental Assessment (EA). Livestock grazing systems cannot be properly evaluated if not run in conformance with the designed system.

9. The BLM would construct or furnish materials for construction of fences, cattleguards, springs, wells, and pipelines. Reservoirs and livestock trails would be constructed by BLM. Due to past problems with facility maintenance, arrangements would be specified in individual project maintenance agreements in order to prevent loss of the initial investment. Generally, where the primary objective of the facility (fences, wells, springs, and pipelines) is for livestock management the burden of maintenance would be on the permittee. Cattleguards would be maintained generally by whoever has road maintenance responsibility. Livestock trails and reservoirs would be maintained by BLM.

IMPLEMENTATION

Eight years would be required to fully implement this alternative (Table 2-5). Pursuant to 43 CFR 4160.3(c) the final decision would be in full force and effect and provide for a period of 30 days after receipt for filing of an appeal, provided, the full force and effect final decision is required for the orderly administration of the range or for the protection of other resource values (see 4.477 43 CFR).

Pursuant to 43 CFR 4110.3-2(c), if consistent with resource management needs the cancellations

TABLE 2-5

INTENSIVE MANAGEMENT AMP IMPLEMENTATION SCHEDULE 1/

Existing - Year 1

6501 - Ramboulet Park
6502 - Red Cloud
6503 - Porter
6504 - Henson Creek
6505 - Chuchuru Brothers
6506 - Burrough Park
6507 - American Flats
6508 - Mill Gulch
6509 - American Lake
6510 - Poughkeepsie
8900 - Cement Creek
8901 - Gladstone
8902 - Eureka
8903 - Price Brothers
8905 - Cummingham Gulch
8906 - Molas Lake
8907 - Deer Park
8908 - American Basin
8909 - Minnie Gulch
8911 - Maggie Gulch

Existing - Year 2

6011 - Willow Creek
6033 - Willow Creek AMP
6103 - Indian Creek
6104 - Powderhorn AMP
6105 - Yeager Gulch
6107 - Iola-Powderhorn
6108 - Park Creek
6213 - Mill Creek
6300 - Sheeps Gulch
6311 - Gold Basin
6312 - Lower Cochetopa
6313 - Stubbs Gulch
6338 - Muddy-Poison
6344 - Trail Creek
6347 - Manchego

To be Developed - Year 3

6001 - Goose Creek
6027 - Antholz
6034 - Little Willow
6050 - Maurer Blue Canyon
6053 - Cox Park
6056 - Highway
6100 - Ten Mile Spring
6101 - Sapinero
6102 - Powderhorn
6031 - Alpine Plateau
6032 - Blue Mesa
6109 - Monuments

To be Developed - Year 4

6111 - Cathedral
6112 - Cobolla Creek
6115 - Devils Lake
6117 - Lone Pine
6120 - Red Ride
6125 - J. S. Ward
6130 - Campbell Creek
6131 - Hells Canyon
6200 - Dillon Mesa
6202 - Stevens Creek
6203 - Beaver Creek
6204 - Stuben Creek

To be Developed - Year 5

6301 - Cabin Creek
6302 - Alder Creek
6329 - West Pass Creek
6206 - Blinberry Gulch
6207 - West Antelope
6208 - West Antelope Creek
6210 - Antelope Creek
6216 - Antelope Creek
6304 - Doyleville Group
6306 - Waunita Hot Springs
6317 - South Parlin Flats
6318 - Camp Kettle
6320 - Big Draw
6323 - Barrett Creek

To be Developed - Year 6

6314 - Holly-Cockran
6315 - Upper Means
6327 - Vouga Reservoir
6328 - Rock Creek
6325 - Mill Hill
6326 - Snyder Gulch
6348 - Texas Creek
6349 - Mesa
6350 - Van Tassel
6353 - Lower Means
6359 - Baxter

To be Developed - Year 7

6127 - Lake Fork
6150 - Round Mountain
6180 - Rock Creek
6305 - Woods Gulch
6308 - Hot Springs
6309 - Tomichi Dome
6342 - Dome
6343 - Poison Gulch
6346 - Cochetopa Creek
6500 - Wade Gulch

To be Developed - Year 8

6212 - Towner
6303 - Line Spring
6310 - Plesent View
6360 - Big Draw
6362 - Cold Springs
6365 - Barrett Creek
6400 - Jacks Cabin
6401 - Flat Top
6402 - State River

1/ All alternatives except Elimination of Livestock and No action.

recommended under this alternative may be scheduled over a period not to exceed 3 years with the full cancellation coming in the last year.

Livestock Grazing Management Program, Fall Rest Alternative

Under this alternative all proposed components would be the same as those described under MFP/Spring Rest except for the rest schedule and potential allocatable AUMs in the long term. The MFP/Spring Rest Alternative outlines a method of grazing which restricts use in the spring and allows more rest during this period. The Fall Rest Alternative assumes the opposite.

VEGETATION ALLOCATION

Under this alternative the proposed initial livestock grazing use would be the same as MFP/Spring Rest Alternative (44,542 AUMs livestock; 34,200 AUMs wildlife). Potentially allocatable AUMs for the long term (20 years from implementation--year 2005) would be 101,848 (57,612 livestock; 44,236 wildlife) by management and 126,169 by vegetation treatment (71,370 livestock; 54,799 wildlife). The potential AUMs shown above do not consider overlap between big game and livestock. The allocation of AUMs potentially available in the year 2005 is broken down specifically for the purpose of analysis only. Actual allocations would be adjudicated on land use decisions at that time.

FALL REST SCHEDULE

The fall rest schedule establishes constraints under which late season grazing could occur. It is based on the premise that grazing immediately before the fall dormancy period of grasses is more detrimental to the continued vigor of the plants than grazing at any other period. Summer grazing is the next most detrimental period followed by spring grazing, and grazing during plant dormancy, which is the least harmful period of use (Trlica, personal communication 1979). In the fall rest schedule periods of late season use are followed in subsequent years by rest at earlier periods. This is to allow periodic time for regrowth and accumulation of carbohydrate reserves during the grazing cycle.

Table 2-6 shows how the fall rest schedule would affect development of the grazing formula. As outlined in Table 2-6, the graze period 7/1 - 7/15 does not suggest grazing has to occur for that period only. It means grazing from 7/1 through 7/15 supports the restriction of one year rest from 7/1 through 7/15 for each year grazed.

As shown in example 1, a range user wishes to graze his livestock from 7/15 to 12/30. Under Schedule G the rest constraints would be as follows:

1 year rest in the period 7/1-7/15 for 3 years grazed,

2 years rest in the period 7/16-7/31 for 2 years grazed,

3 years rest in the period 8/1-8/31 for every year grazed. Under Schedule G, rest constraints for example 2 would be:

1 year rest in the period 7/16-7/31 for 2 years grazed,

2 years rest in the period 8/1-8/30 for 1 year grazed. Under Schedule G, rest constraints for example 3 would be to:

rest 1 year in the period 8/1-8/30 for each year grazed.

Table 2-7 outlines the minimum constraints for Schedule G (fall rest).

As with the MFP/Spring Alternative, the separate fall rest schedules outlined (Table 2-8) vary according to key forage species for plant phenology, climate, topography, elevation of the allotment, and area locality. Basically, the fall rest schedule would not restrict the AMP developer to any predetermined livestock grazing system. Development of the grazing system would first take the needs of the key forage plants into account in order to meet the objectives of the AMP and devise the minimum fall rest these plants require to produce both shoot and root growth. Secondly, the needs of the range user, wildlife, watershed, and other resources would have to be incorporated into the fall rest schedule and a balanced livestock grazing program initiated. Once the schedule is selected it would need to be followed through one complete cycle (up to 5 years). Upon evaluation the schedule would recycle to year one if data from studies showed the objectives of the AMP were being met. If not, the schedule would be changed to meet the objectives.

Although the fall rest schedule is new and essentially untested, much research supports the foundations of the schedule--that grazing during the fall predormancy period of grasses is the most detrimental period of use, and that periodically allowing regrowth before dormancy would restore carbohydrate reserves. Some of the research is summarized below. A more detailed discussion of the research may be found in Appendix RM-9.

TABLE 2-6

EXAMPLES OF USING ONE FALL REST SCHEDULE

SCHEDULE G

Graze Period	Yrs. Minimum Rest Required/Yrs. Grazed
7/1-7/15	1/1
7/16-7/31	2/1
8/1-9/15	3/1
9/16-On	No Minimum Rest Required

EXAMPLE #1: GRAZE 7/13 to 12/30

Year	7/1 to 7/15	7/16 to 7/31	8/1 to 9/15	9/16 ON
1	///	///	///	///
2	///	///		///
3	///			///
4				///
5	Recycle to Year 1			

/// = Graze

EXAMPLE #2: GRAZE 7/18 to 12/30

Year	7/1 to 7/15	7/16 to 7/31	8/1 to 9/15	9/16 ON
1		///	///	///
2		///		///
3				///
4	Recycle to Year 1			

/// = Graze

EXAMPLE #3: GRAZE 8/10 to 12/30

Year	7/1 to 7/15	7/16 to 7/31	8/1 to 9/15	9/16 ON
1			///	///
2				///
3	Recycle to Year 1			

/// = Graze

TABLE 2-7

MINIMUM FALL REST/GRAZE PERIOD

Line	7/1	7/16	8/1	8/16	End	Years Minimum Rest Required/ Years Grazed
A	///	///	///	///	///	3/1
B	///	///				2/1
C	///					1/1
D				///	///	0/1
E			///	///	///	1/1
F		///	///	///	///	2/1
G	///	///	///	///	///	3/1

/// Graze
Line A Graze 7/1-On
7/1 - 7/15 Rest one year for three years grazed.
7/16 - 7/31 Rest two years for two years grazed.
8/1 - 8/15 Rest three years for each year grazed.
8/16 - On No minimum rest required.
Line B Graze 7/1 - 7/31
7/1 - 7/15 Rest one year for two years grazed.
7/16 - 7/31 Rest two years for each year grazed.
Line C Graze 7/1 - 7/15
7/1 - 7/15 Rest one year for each year grazed.
Line D Graze 8/16 - On
8/16 - On No minimum rest required.
Line E Graze 8/1 - On
8/1 - 8/15 Rest one year for each year grazed.
8/16 - On No minimum rest required.
Line F Graze 7/16 - On
7/16 - 7/31 Rest one year for two years grazed.
8/1 - 8/15 Rest two years for each year grazed.
8/16 - On No minimum rest required.
Line G Graze 7/1 - On
7/1 - 7/15 Rest one year for three years grazed.
7/16 - 7/31 Rest two years for two years grazed.
8/1 - 8/15 Rest three years for each year grazed.
8/16 - On No minimum rest required.

TABLE 2-8

PROPOSED GRAZING SCHEDULES (FALL/REST)

Graze Period	Minimum Rest Requirement/Years Grazed
	Schedule A
5/01-5/09	1 / 1
5/10-6/15	2 / 1
6/16-9/30	3 / 1
10/01- on	No Minimum Rest Required
	Schedule B
5/15-5/31	1 / 1
6/01-6/30	2 / 1
7/01-9/30	3 / 1
10/01- on	No Minimum Rest Required
	Schedule C
6/01-6/15	1 / 1
6/16-6-30	2 / 1
7/01-9/15	3 / 1
9/16- on	No Minimum Rest Required
	Schedule D
6/15-7/15	1 / 1
7/16-9/15	2 / 1
9/16- on	No Minimum Rest Required
	Schedule E
7/01-7/15	1 / 1
7/16-9/15	2 / 1
9/16- on	No Minimum Rest Required
	Schedule F
5/15-6/14	1 / 1
6/15-6/30	2 / 1
7/01-7/31	3 / 1
8/01-9/30	4 / 1
10/01- on	No Minimum Rest Required
	Schedule G
7/01-7/15	1 / 1
7/16-7/31	2 / 1
8/01-9/15	3 / 1
9/16- on	No Minimum Rest Required
For Allotment 6503 the following grazing schedules are recommended:	
	Schedule H
6/01-6/15	1 / 1
6/16-6/30	2 / 1
7/01-7/15	3 / 1
7/16-9/15	4 / 1
9/16- on	No Minimum Rest Required
	Schedule I
6/15-6/30	1 / 1
7/01-7/15	2 / 1
7/14-7/31	3 / 1
8/01-9/15	4 / 1
9/16- on	No Minimum Rest Required

The depletion of carbohydrate reserves of plants is believed to be the primary factor responsible for loss in plant vigor and subsequent range deterioration, according to Trlica and Cook (1971). Maximum carbohydrate reserves are not attained until a plant completes its life cycle (seed ripe or later). Plants store reserves during periods of slow herbage growth, particularly late in the season, when the construction of carbohydrates during photosynthesis exceeds the demand of growth and assimilation (Coyne and Cook, 1970).

Long term plant vigor is correlated to the magnitude of carbohydrate storage sometime at the end of the growth period. The carbohydrate reserves are used during initial spring growth, during periods of rapid growth, and for respiration and slight growth during winter (Coyne and Cook 1970; Cook 1966; Priestly 1962; Troughton 1957; Weinmann 1961). Reduction of carbohydrate reserve levels lowers herbage and rate of growth (Cook 1958; Weinmann 1946). Spring growth also may be delayed and plants may be more susceptible to winter injury and disease as a result of low carbohydrate reserves (Cook 1958; Weinmann 1946; McCarty 1938; Kust 1960 *in* Coyne and Cook 1970).

Trlica and Cook (1972) found that plants defoliated at peak flowering or maturity (seed ripe) had less fall carbohydrate reserves than plants defoliated at dormancy the previous fall or during early spring growth. Owensby, Smith, and Rains (1977), and Trlica and Cook (1972), observed that if plants were allowed to produce sufficient new growth after defoliation before the fall dormancy period, adequate storage of carbohydrates occurred, and reduced plant vigor was not evident. Trlica and Cook (1972) also found that the magnitude of fall carbohydrate reserves is directly related to the amount of new growth after being defoliated. In general, defoliation early in the growing season is less likely to reduce carbohydrate storage in grasses than late season defoliation (Sampson and McCarty 1930; Drawe 1972; Trlica and Cook 1971; Laycock and Conrad 1969; McCarty and Price 1942; and Trilica et al. 1977).

Figure 2-1 shows the relationship between development, herbage yield, and carbohydrate reserves of a typical grass plant. Carbohydrate reserves are lowest during rapid growth, and are gradually restored until a maximum level is reached in the fall. Figure 2-2 shows a similar situation for plants (usually shrubs) which do not restore their reserves until after seed ripe. Figure 2-3 shows the response of carbohydrate reserves of a grass through a four year cycle of grazing under the fall rest schedule. After year one (continuous grazing until seed ripe) rest begins at earlier periods in subsequent years until, at year four, season long rest occurs. This rest cycle allows for periodic regrowth after grazing, and results in restoration of carbohydrate reserves.

A contrasting situation is evident in Figure 2-4, showing the response of carbohydrate reserves of a grass through a 4 year cycle of continuous grazing. Each year of grazing results in a slightly lowered level of reserves as the plant enters dormancy. No opportunity for restoration of the reserves is built into the grazing cycle. Eventually the reserves may fall below a critical level and the plant will die.

That grass regrowth would occur after early season use is supported by the average monthly precipitation patterns at various locations in the Gunnison Basin. Precipitation, which is the most important factor influencing vegetation production (Stoddart et al. 1975) is normally available during mid and later summer. At all weather stations within the Gunnison Basin, except Crested Butte, July and August are the months of highest average precipitation. At Crested Butte only January has more total average precipitation than July and August.

Contrary to the above research, spring grazing is commonly thought to be the most detrimental period of use on public land. This is supported by the fact that spring public rangelands are often severely depleted, and in poor condition. However, it is not actually spring grazing as proposed in MFP/Spring Rest Alternative which has been responsible for the poor rangeland condition, but abusive spring grazing which has historically taken place in the EIS area--grazing before rangeland readiness, and grazing above the carrying capacity of the rangeland. For the spring rest schedule to be effective, spring grazing should not occur before rangeland readiness (the four or five leaf stage of desirable grass species), and livestock use should be no greater than 60 percent of the herbage (moderate grazing use) (Trlica, personal communication 1979). Spring use at rangeland readiness or later and no greater than moderate use are components of MFP/Spring Rest Alternative.

It should be pointed out that 60 percent utilization in the spring would be less total herbage than 60 percent utilization in summer, because the plant is smaller. Only 60 percent of the current plant growth should be taken. This is an important factor to take into consideration when grazing in the spring.

The positive features of the fall rest schedule are that it allows livestock operators spring use periods during most of the grazing cycle, yet still maintain the continued vigor of desirable grass species. Spring livestock use of public rangeland is important to livestock operators in the EIS area, since during spring, plants generally have their highest nutritive value (Stoddart et al. 1975) and spring use allows operators to get livestock off of

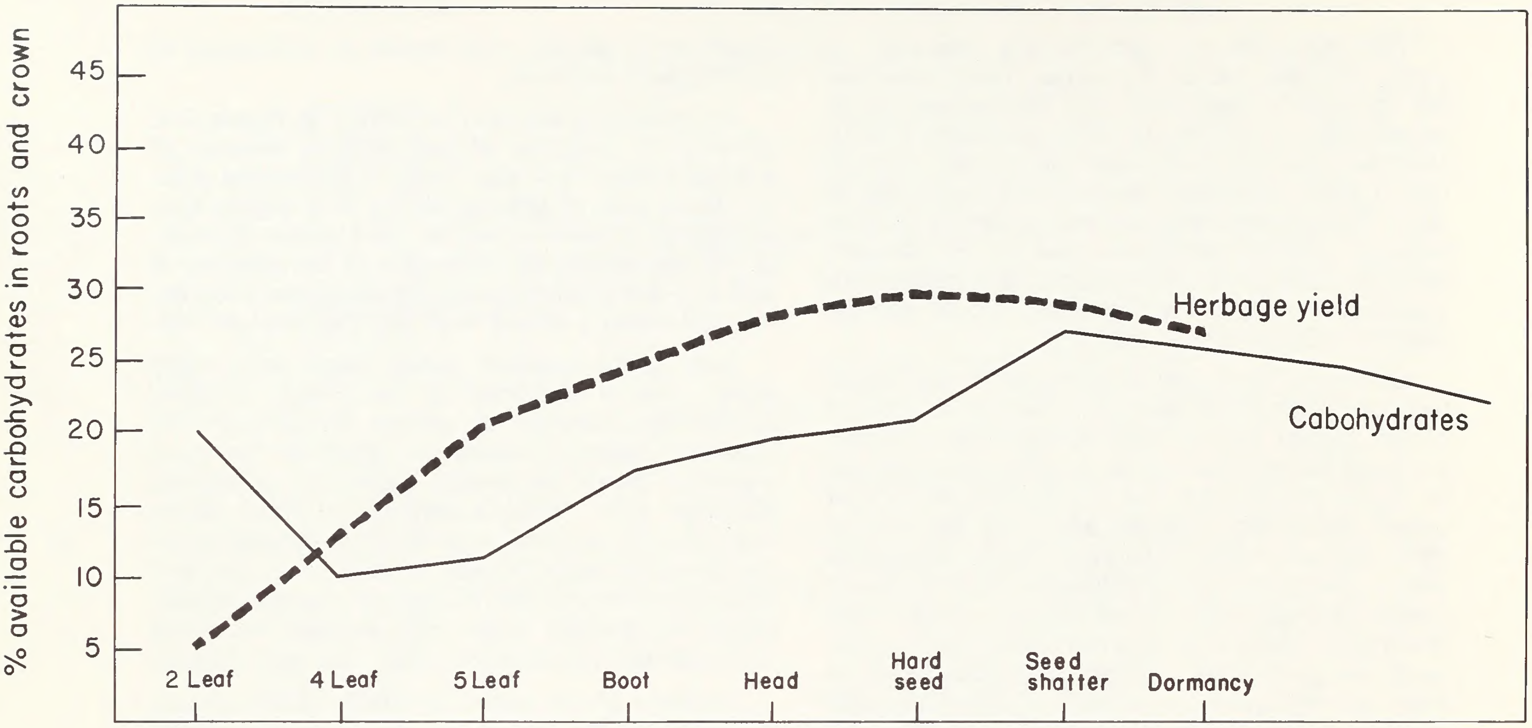

Figure 2-1 Carbohydrate balance and herbage yield of a typical grass species throughout the annual cycle.

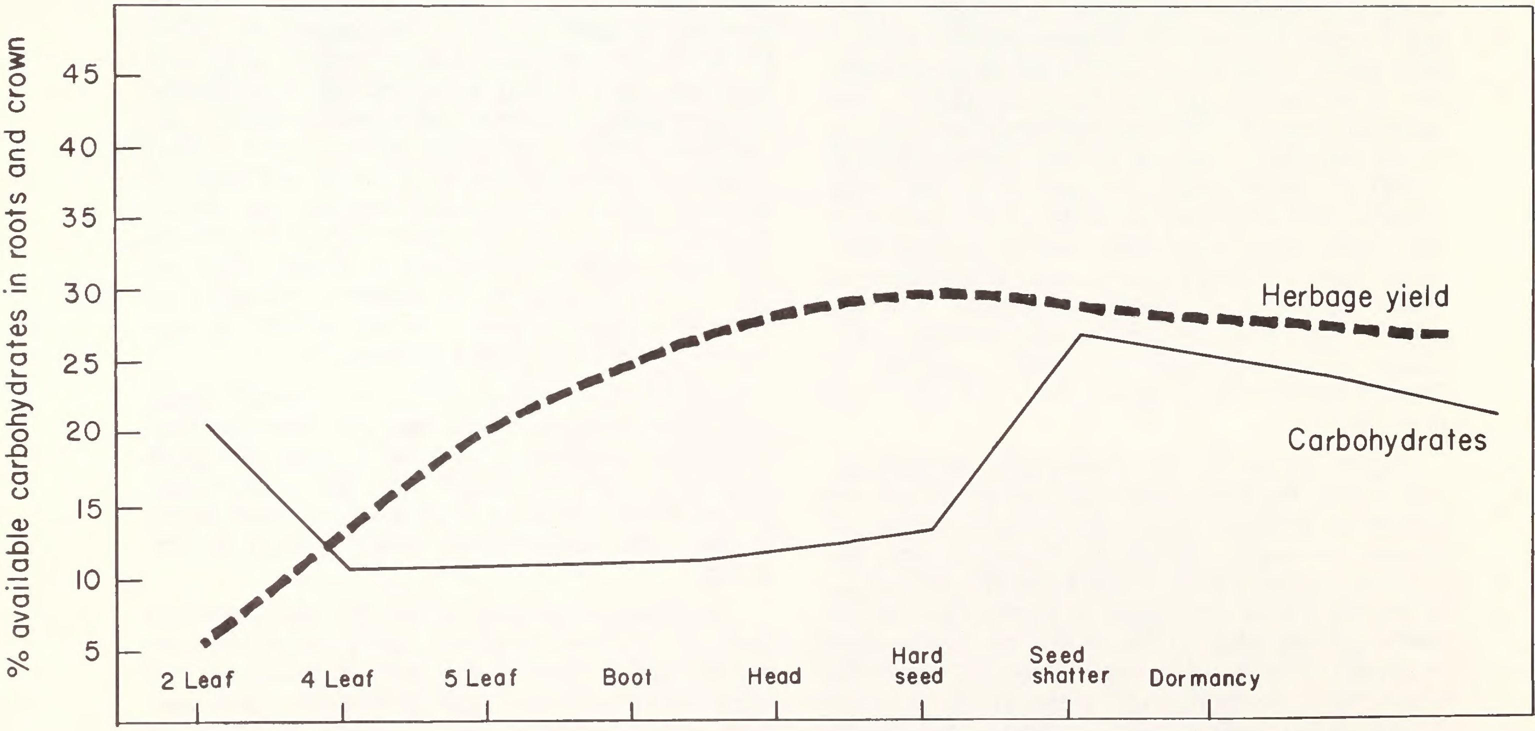

Figure 2-2 Carbohydrate level and herbage yield of a forage species that does not replenish its reserve appreaciably until seed formation.

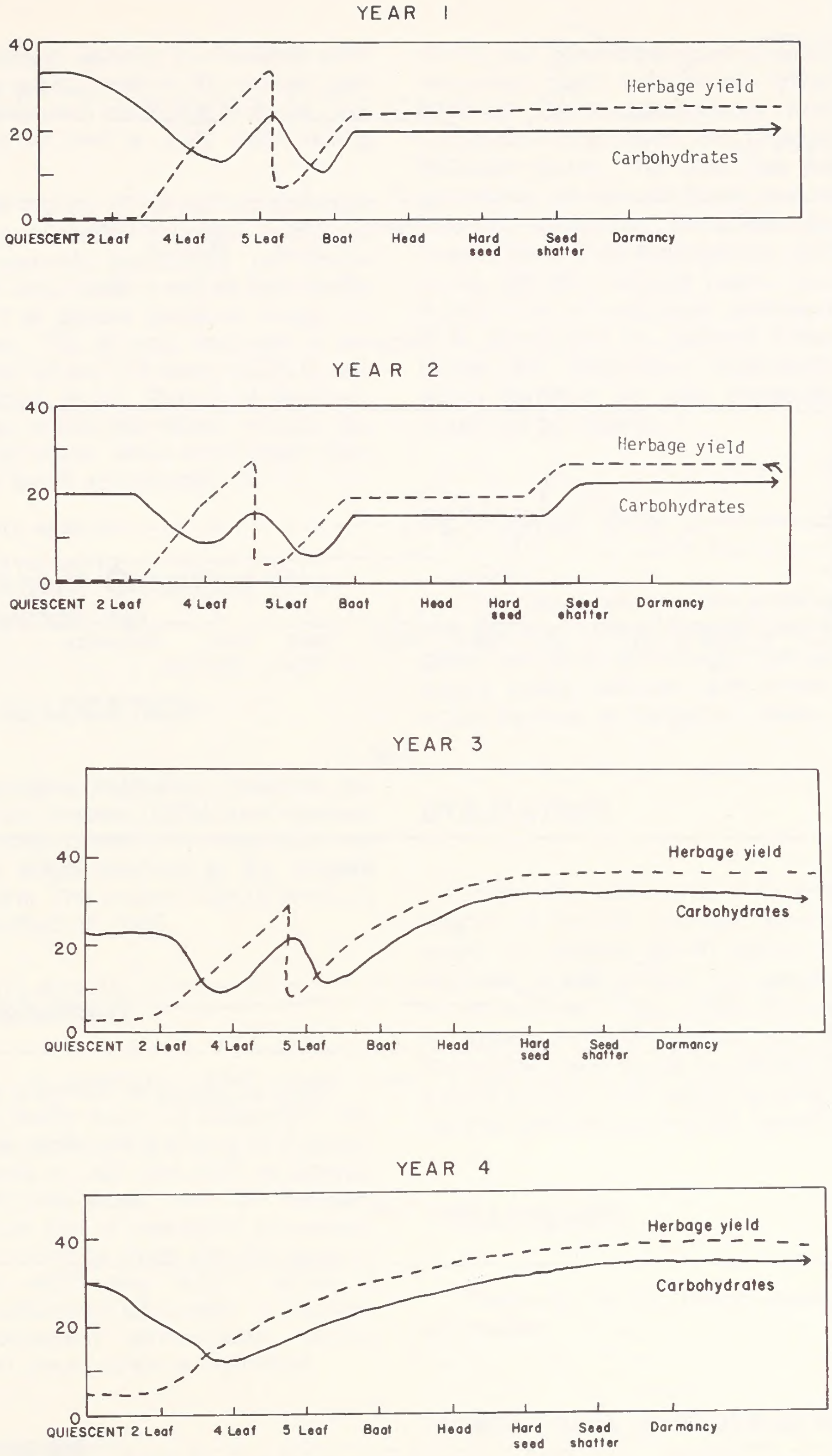

Figure 2-3 Percent available carbohydrates in roots and stems--fall rest system

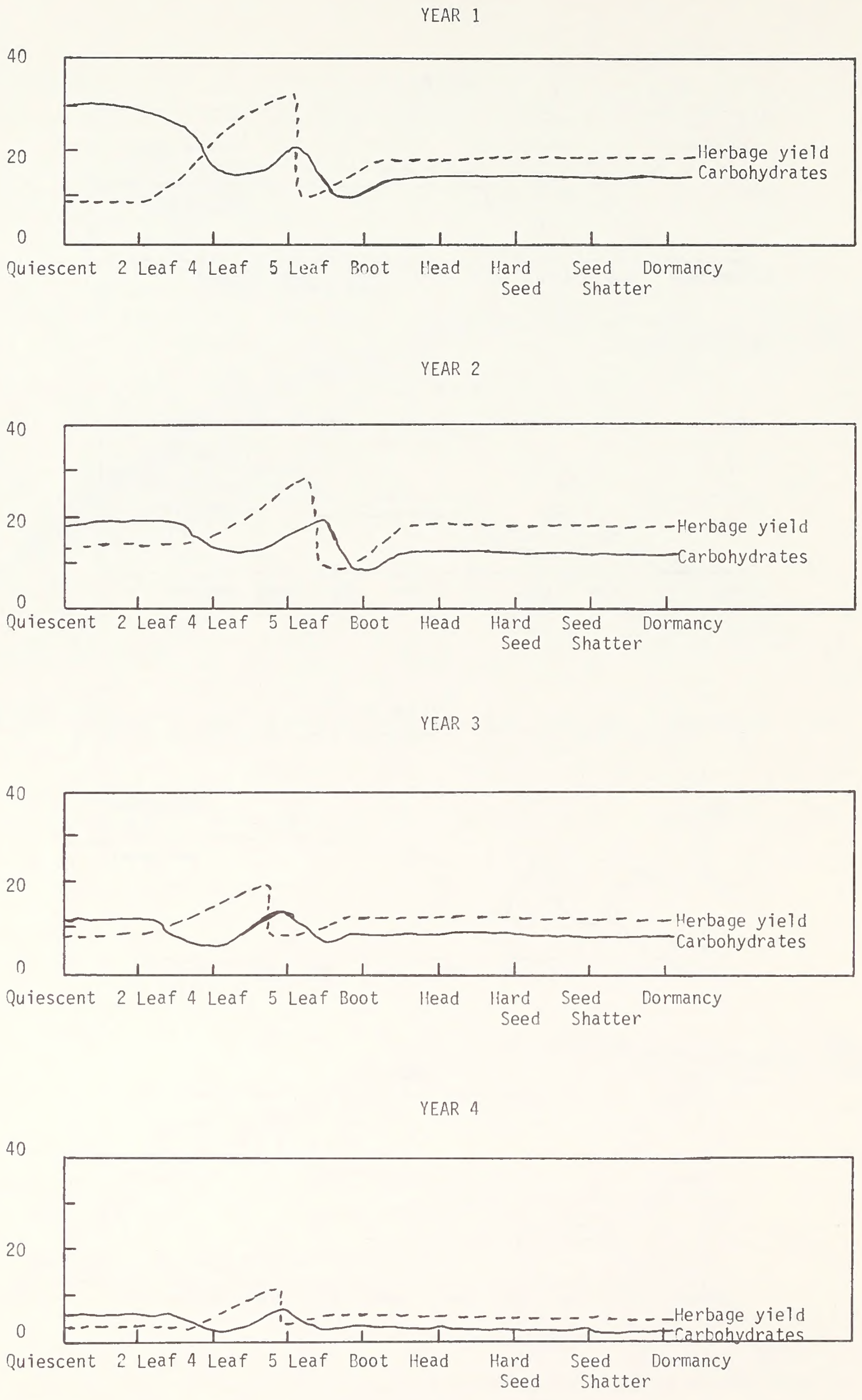

Figure 2-4 Percent available carbohydrates in roots and stems--heavy grazing

their private pastureland. Moving the livestock onto public rangeland in spring enables the private pasture to begin growth and significant herbage production, which can be used to feed cattle during the winter.

Another positive feature of the fall rest schedule is that it periodically allows for regrowth before fall dormancy. The regrowth, particularly on shrubs such as bitterbrush which both livestock and wildlife utilize, would result in greater available forage for wildlife during winter. This is most important in the low elevation portion of the EIS area, which is crucial big game winter range. Periodical regrowth before fall dormancy would also reduce erosion due to spring runoff from snow, since more dried herbage and plant litter would accumulate.

Continue Present Situation (No-Action Alternative)

VEGETATION ALLOCATION

Under this alternative, authorized livestock use would continue at the present (1978) level licensed which is 60,013 AUMs (Table 2-1). Vegetation reserved for wildlife would continue at the present level of 36,141 AUMs. The present rate of livestock use would continue through 2005.

METHOD OF GRAZING

This alternative assumes continued operation of 34 AMPs. No new AMPs would be developed. This alternative assumes continued licensing of livestock use at present levels on 121 non-AMP allotments. Existing AMP allotments would have the flexibility of licensing at actual use of vegetation consumed. Livestock would continue to graze 334,982 acres of public land under AMPs and 260,971 acres of public land on non-intensive allotments. In addition, 11 allotments containing approximately 39,898 acres of public land would continue unallotted.

GRAZING SYSTEMS

Under this alternative there would be 34 AMPs; 18 would have rest rotation and 16 would have deferred rotation grazing systems.

Eleven AMPs are combination FS-BLM cooperative grazing plans. The FS, Gunnison National Forest has administrative responsibility for BLM-administered public land on the following allotments: 6213-Mill Creek, 6338-Muddy Poison, 6344-Trail Creek, 6347-Manchego, 6501-Ramboulet Park, and 6508-Mill Gulch. The BLM has administrative responsibility for national forest systems lands on the following allotments: 6311-Gold Basin, 6107-Iola-Powderhorn, 6104-Powderhorn AMP, 8909-Minnie Gulch, and 8911-Maggie Gulch. Allotment 6111-Cathedral is a non-intensive allotment on which the BLM administers the national forest systems land. Under this alternative, cooperative agreements would continue, but new cooperative agreements would not be initiated.

PERIOD OF USE

This alternative assumes continued early spring, late fall, and season long grazing with minimal regards for plant phenology. Utilization of riparian zones, valley bottoms, and crucial wildlife areas would continue at the present level.

UTILIZATION

Under this alternative it is assumed that the degree of annual herbage removal by livestock would not change (50-60 percent annual growth). Riparian zones (crucial big game winter habitat) would continue to be utilized by both livestock and big game at 60-90 percent annual growth. Less accessible areas would be utilized at 10-30 percent annual growth. Early spring grazing is presently removing 60-80 percent of the current forage.

TREATMENTS

There are no treatments proposed under this alternative.

RANGELAND IMPROVEMENTS

There are no rangeland improvements planned under the no-action alternative. Existing improvements would be maintained at the present level.

KIND OF LIVESTOCK

This alternative assumes the present kind of livestock would continue to be grazed on public land. Changes would probably occur at the present rate. However, flexibility to meet management objectives with a different kind of livestock would not occur.

SUPERVISION AND MONITORING

The no-action alternative assumes the present level of supervision and monitoring would continue. At present, one baseline photo point plot per pasture is the minimum for allotments with AMPs and one photo point plot per allotment on non-AMP or less intensive management allotments. Supervision, compliance, and monitoring of grazing use on AMP allotments occur at the minimum of four times within the grazing season. Non-AMPs or less intensive allotments are monitored a minimum of once. Licensing of existing AMP and non-intensive allotments would continue. Trespass control through rangeland use supervision would continue at the present level.

IMPLEMENTATION

The no-action alternative would not require any implementation, since it would simply be a continuation of the existing situation.

Elimination of Livestock Grazing Alternative

VEGETATION ALLOCATION

Under this alternative, all existing livestock grazing privileges and cooperative grazing agreements would be cancelled.

The purpose of this alternative would be to allocate all available vegetation suitable for wildlife to wildlife (57,983 AUMs) and the remaining vegetation (20,749 AUMs) would be set aside for the enhancement of other resources.

Potentially available allocatable AUMs for the long term (20 years from implementation--year 2005) would be 123,889 (91,250 wildlife; 32,639 visual, watershed, and other resources) without treatment and 151,351 with treatment (96,848 wildlife; 54,503 other). The allocation of AUMs potentially available in the year 2005 was broken down specifically for the purpose of analysis only. Actual allocation would be done based on land use decisions at that time.

METHOD OF GRAZING

No livestock grazing would be allowed on the public lands within the EIS area. Trailing permits would be issued so livestock could travel across public lands to reach national forest systems, state, and private lands.

UTILIZATION

The proper use on forage plants (see Appendix RM-2) would have to be monitored on public land where trailing of livestock occurred.

RANGELAND IMPROVEMENTS

Treatments

Vegetation manipulation on 34,824 acres for the purpose of improving wildlife and watershed values is proposed under this alternative (see Table 2-1 and Appendix RM-7). As in the Spring Rest Alternative, the 1975 Memorandum of Understanding between the BLM and CDOW would be adhered to. All other constraints mentioned in that alternative would be followed. These treatments would be designed to improve wildlife, watershed, or other values. It is anticipated that the methods of vegetation manipulation techniques would be 5 percent spraying (1,740 acres) with a chemical herbicide, 15 percent mechanical (5,220 acres), and 80 percent prescribed burning (27,860 acres).

Facilities

New rangeland facilities would be constructed, but only those that would benefit wildlife, watershed, and other resources (e.g., rock or wire gabions, springs, pipelines, and troughs). Maintenance of existing facilities would be continued if they benefit resources other than livestock grazing. Range users with investments in cooperative agreements would be entitled to appropriate project salvage rights.

Under this alternative, extensive fencing out of public lands may be needed. Approximately 1,000 miles of fence, 350 cattle guards, and 80 manual gates would be required. Initial construction would be 6.05 million dollars with an annual maintenance cost of $300,000 dollars.

KIND OF LIVESTOCK

Under this alternative there would be no need to determine the AUMs for the separate kinds of livestock.

SUPERVISION AND MONITORING

Under this alternative the need for supervision may be great. Trespass of livestock from other lands onto public lands would be continual. Monitoring studies would be initiated and implemented to show possible change due to wildlife use.

IMPLEMENTATION

Implementation of this alternative would be done in either of two ways: (1) full force and effect, i.e., the year following the MFP Step III decision all grazing on public land would be eliminated and all non-essential projects would be eliminated; or (2) implementation would occur within a 4 year span, during which range users would be given 3 years to cease grazing, either gradually over the 3 years or completely at the end of the third year. Project removal would occur during the fourth year.

Optimize Wildlife and Watershed Values Alternative

VEGETATION ALLOCATION

Under this alternative, wildlife would be allocated the maximum percentage of vegetation produced annually. All vegetation resources suitable for wildlife would be allocatd to wildlife. All remaining AUMs would be allocated to livestock (see Table 2-1). Appendix RM-10 details livestock/wildlife overlap vegetation by allotment.

This alternative would result in a level of livestock use equal to a 39,268 reduction in AUMs or 65 percent reduction over the present grazing management program. This would also be a 53 percent reduction in livestock allocations over the proposed action. Animal unit months allocated to wildlife would be 57,997; an increase of 62 percent. Livestock would be awarded 20,745 AUMs.

Potentially allocatable AUMs for the long term (year 2005) would be 113,705 (83,749 wildlife; 29,956 livestock) with management only and 134,380 AUMs (98,977 wildlife; 35,403 livestock) with management and vegetation treatment. The potential AUMs would be allocated at the same ratio as that used in the initial allocation of this alternative. As with all alternatives, allocation of probable AUMs was done for analysis only. Actual allocations would be based on land use decisions at that time.

METHOD OF GRAZING

The number of AMPs would be 46; non-AMPs would decrease to 107; and the number of allotments with livestock use eliminated would increase to 13.

Livestock would continue to graze within the boundary of the Powderhorn Primitive Area; however, the overall reduction of livestock in this area would be 74 percent, the largest reduction occurring in the high recreation use area.

Under this alternative, as with the Spring Rest Alternative, 11 Forest Service-Bureau of Land Management cooperative agreements would continue and approximately 33 additional plans would have to be developed.

PERIOD OF USE

The turnout date would have to be altered to eliminate use September 15 through May 30 in 70 allotments; September 15 through June 30 in 44 allotments; and September 15 through July 30 in 21 allotments. Thirty-two allotments would not appreciably change in turnout dates.

UTILIZATION

Under this alternative the degree of utilization would be the same as under the Spring Rest Alternative.

RANGELAND IMPROVEMENTS

Treatments

The level of vegetation manipulation would be site specific; objectives would be to minimize soil erosion, especially accelerated erosion, increase plant density, expand crucial wildlife winter habitat, and improve water quality and increase quantity. Total maximum acres for treatment would be 111,458. It is assumed that under this alternative the methods of vegetation manipulation would be 5 percent spraying (5,570 acres) with a chemical herbicide, 15 percent mechanical (16,710 acres), and 80 percent prescribed burning (89,160 acres).

Facilities

Fences would be removed if not needed for livestock control and livestock would be herded more than at present. Rangeland developments would be completed or constructed for existing and proposed AMPs: 63 troughs, 63 spring developments, 23 miles of trail construction, and 50 reservoirs.

KIND OF LIVESTOCK

Kind of livestock would be limited to present kind of livestock licensed on individual allotments.

SUPERVISION AND MONITORING

Allotment supervision and compliance would not have to be increased over the present level. Monitoring studies would have to be imposed on all allotments. Administration of licenses, permits, and transfers would not appreciably increase.

IMPLEMENTATION

Under this alternative, 5 years would be required to fully implement the grazing program. Adjustments in the grazing use would be made the first year on allotments which would receive a 15 percent or less reduction in grazing privileges. Three years would be allowed for allotments with over 15 percent. A gradual reduction in privileges would occur within the first 2 years with the largest percentage occurring in the third year.

Optimize Livestock Grazing Alternative

VEGETATION ALLOCATION

This alternative would provide for the development of vegetation for livestock to its optimum annual production.

Vegetation allocation to livestock would be 61,356 AUMs, an increase of 2 percent over present allocations. Wildlife would be allocated 17,386 AUMs, a reduction of 52 percent. All overlap AUMs between livestock and wildlife would be adjudicated to livestock (see Table 2-1).

Potentially allocatable AUMs for the long term (year 2005) would be 66,733 (14,734 wildlife; 51,999 livestock) with management only and 118,569 AUMs (26,180 wildlife; 92,389 livestock) with management and vegetation treatment. The allocation of potential AUMs was based on the ratio used in the initial allocation of this alternative. As with all alternatives, the probable AUMs were allocated for analysis only. Actual allocations would be based on land use decisions at that time.

METHOD OF GRAZING

This alternative assumes continued operation of 34 existing AMPs (334,982 acres public land; 64,261 acres other lands). An additional 96 AMPs would be developed and implemented (286,439 acres public land; 55,896 acres other lands). Non-intensive grazing would occur on 36 allotments (14,430 acres public land; 4,528 acres other lands); grazing would not be eliminated on any allotments; and no allotments would be unalloted.

All of the AMPs would be constrained by a rest schedule. On non-intensive allotments, stocking rates and seasons of use would constrain livestock grazing use, but a schedule would not be applied. Unalloted allotments proposed in the spring or fall rest alternative would all be grazed by livestock to the degree that slope, timber, and rock outcrops (suitability) would allow. No allotments would be excluded from livestock grazing.

Initiation of intensive management on certain creeks (see Spring Rest Alternative) would also be proposed in this alternative. However, the objectives for management would consider wildlife, fisheries, and watershed as secondary to primary livestock objectives.

Creeks eliminated from grazing in the Spring Rest Alternative would be included in the above mentioned group. No creeks would be eliminated from livestock grazing.

Within the Powderhorn Primative Area there would be a 9 percent increase in livestock grazing over the present situation.

As with the Spring Rest Alternative cooperative agreements between the Forest Service and Bureau of Land Management would continue and 33 additional cooperative plans would be developed.

PERIOD OF USE

A rest schedule would be implemented on all intensively managed allotments and a period of use established for non-intensive allotments. As with the Spring Rest Alternative, all of the AMPs would denote the number, location, flexibility, and time of grazing. Less intensive allotments would include grazing permits specifying the numbers of animals to be grazed, the periods of use, actual use, and other terms and conditions deemed appropriate by the Secretary of the Interior for management of the public lands.

UTILIZATION

Under this alternative the degree of utilization would be the same as under the Spring Rest Alternative.

RANGELAND IMPROVEMENTS

Treatments

Maximum livestock vegetation or its potential would be achieved by using vegetation manipulation practices (sagebrush spraying, mechanical treatment, and prescribed burning--see The Spring Rest Alternative for an explanation of these techniques). The primary objectives of treatments would be to remove or suppress undesirable plant species and increase vegetation production. Total maximum acres for treatment would be 201,955. It is anticipated that the methods of vegetation manipulation would be 60 percent spraying with a chemical herbicide, 15 percent mechanical, and 25 percent prescribed burning.

Facilities

Under this alternative the additional facilities needed to support livestock would be the same as those proposed under the Spring Rest Alternative.

KIND OF LIVESTOCK

Under this alternative kind of livestock would not be limited because of wildlife needs. The kind of livestock use would be first priority use on all ranges. Crucial elk and deer ranges would be open for winter and fall sheep grazing. Utilization of key vegetation species would be set for sheep and/or cattle on all range sites without regard for winter crucial and critical wildlife habitat. Any requests for changes in kind of livestock would be handled under the Bureau's environmental assessment process. The proposed allocation of AUMs for this alternative has been calculated for the present kind of livestock.

SUPERVISION AND MONITORING

Under this alternative, as with the AMP alternative additional monitoring studies would be installed on all AMP allotments, and a minimum of one study per allotment on all non-intensive allotments.

Assuming the intensity of livestock grazing would increase, supervision and compliance of both non-intensive and AMP allotments would increase accordingly.

IMPLEMENTATION

As in the Spring Rest Alternative, implementation of this alternative would occur within 8 years. The Bureau and range user would have 3 years to determine the livestock grazing capacity through actual use submitted by the range user and intensive field surveys (described in Supervision and Monitoring, Spring Rest Alternative), conducted by the range user and Bureau employees. In the third year, data gathered would be analyzed and the decision would become in full force and effect as to the stocking level or grazing capacity.

ALTERNATIVES ELIMINATED FROM DETAILED STUDY

Eliminate Livestock Grazing Above 10,000 Feet

Comments received during public scoping meetings held in Lake City and Silverton expressed some interest in eliminating domestic sheep grazing in the higher elevations of the EIS area. However, elimination of livestock grazing at an arbitrary altitude would be difficult to administer, especially considering the fractured land ownership pattern. That is, there are many patented mining claims in the area that are private land; and few accurate surveys exist.

Also, such an elimination would greatly reduce the sheep industry in the EIS area, which is dependent on high altitude summer grazing ranges. The elimination of livestock grazing alternative discusses and analyzes the complete removal of domestic livestock from public land in the EIS area.

Eliminate Sheep Grazing

Comments from the general public expressed some interest in removing sheep from public lands in the EIS area. Since most sheep grazing in the area occurs in the American Flats/Silverton unit (10,000-foot elevation), such an alternative would be nearly identical to Eliminate Livestock Grazing Above 10,000 Feet, discussed above.

Eliminate Livestock Grazing From the Powderhorn Primitive Area

Some comments received at public meetings expressed an interest in eliminating grazing within the boundaries of the Powderhorn Primitive Area. However, the MFP/Spring Rest Alternative proposes eliminating or reducing livestock use in areas where conflicts exist with recreation, watershed, or riparian values. In the case of the Powderhorn Primitive Area, livestock grazing use would be allowed to the extent it is consistent with current wilderness regulations and management policies. A separate EIS is being prepared on wilderness designation of the primitive area.

Eliminate Elk Use on the Area Surrounding Gunnison, Colorado

Some interest was expressed at public meetings and by written comments concerning elimination of elk use on the area surrounding Gunnison, Colorado. The commenters felt that, due to high elk numbers, considerable use takes place on lower private lands while the higher elevation public lands are covered with snow.

For a number of legal and technical reasons, this alternative is not within the jurisdiction of the BLM. The state Division of Wildlife is responsible for big game numbers; the BLM is responsible only for habitat on public lands. Also, BLM has no authority over uses on private land, but is concerned with balanced multiple use within the resource capacity on public lands.

INTERRELATIONSHIPS

Federal Agencies

FOREST SERVICE

A number of BLM permittees also have grazing permits on national forest systems lands. Although the BLM and FS administer separate grazing management systems, permittees often use the leased lands in conjunction. That is, they use public lands in the spring, national forest systems lands during the summer, public lands again in the fall, and private lands during the winter. Therefore, adjustments to use on public lands may result in some adjustment to use on national forest systems lands.

NATIONAL PARK SERVICE

The National Park Service administers approximately 28,000 acres of public lands withdrawn by the Bureau of Reclamation for the Curecanti Unit of the Colorado River Water Storage Project. At present, livestock grazing on these lands is managed by BLM, and the NPS has indicated they prefer to continue the program. An agreement between the BLM, NPS, and Water and Power Resource Service (formerly the Bureau of Reclamation) will be established to formalize the procedure.

State Agencies

COLORADO DIVISION OF WILDLIFE (DOW)

DOW manages wildlife numbers throughout the state, including public lands; BLM manages wildlife habitat on public lands. Since several of the alternatives would require reductions in herd sizes to correspond with reduced vegetation allocations for wildlife, coordination between BLM and DOW would be required.

COLORADO STATE WATER ENGINEER

Applications for water rights are filed with the Colorado State Water Engineer. The water rights are adjudicated through the District Water Court, with assistance from the State Engineer. BLM would file for water rights on most water development facilities (all springs and well, and stockwater reservoirs over a certain size).

Private Proposals

Several private sector development proposal sites or areas of interest exist within or adjacent to the EIS area. Generally, these projects involve mineral exploration or development. AMAX has proposed a molybdenum mine and mill near Crested Butte, north of the EIS area; Earth Sciences, Inc., has proposed an alunite mine on Red Mountain, southwest of the EIS area; Homestake Mining Company has proposed a uranium mine and mill near Sargents, east of the EIS area; and Buttes Oil and Gas Company has expressed interest in a phosphate(apatite)/columbium/titanium development near Powderhorn, within the EIS area. Since the relationships these possible developments could have with rangeland management would be similar, they will be discussed collectively.

None of the proposed projects, other than that near Powderhorn, would remove any public land from grazing use within the EIS area. However, construction of the proposed developments, and the large work forces required to operate them, could affect rangeland management. As observed in other areas, when large work forces enter a relatively unpopulated area, agricultural land is often subdivided for housing. If the land is base property required for a federal grazing permit, the permittee must relinquish the permit, and the allotment is either transferred to another permittee or remains unallotted.

The localized inflationary pressures brought about by industrial development in an agricultural area are twofold. First, the wages paid by the new development are generally higher that those prevailing in the agricultural sector, making it more difficult for that sector to obtain necessary labor. Second, with higher prevailing wages and new money in the area, prices for goods and services generally rise, making it more difficult for the agrucultural sector, with its relatively fixed income, to keep pace.

All of these effects could lead to ranchers going out of business, which in turn would affect any proposed rangeland management system.

SUMMARY/COMPARISON OF ALTERNATIVES

An impact summary and comparison of the alternatives is presented in Table 2-9. For additional detail on impacts, see Chapter 4, Environmental Consequences.

TABLE 2-9

IMPACT COMPARISON TABLE

Impact	Present Situation	MFP Step II Spring Rest		Fall Rest		No Action		Elimination of Livestock Grazing		Optimize Wildlife and Watershed		Optimize Livestock Grazing	
		S/T *	L/T **	S/T	L/T	S/T	L/T	S/T	L/T	S/T	L/T	S/T	L/T
VEGETATION													
Production (lbs/ac/yr)	518	365	735	365	830	521	467	480	865	340	884	400	780
Cover (% basal)	18	13	26	13	28	17	17	16	35	9	35	12	27
Condition (acres)													
Excellent	0	0	439	0	439	0	0	0	47,756	0	27,750	0	31,790
Good	43,051	43,051	213,577	43,051	232,309	43,051	10,555	43,051	250,575	43,051	273,346	43,051	164,635
Fair	143,724	143,724	60,323	143,724	42,420	143,724	111,230	143,724	8,164	143,724	5,389	143,724	16,922
Poor	119,660	119,660	32,096	119,660	31,267	119,660	184,650	111,960	0	119,660	0	119,660	93,088
SOILS													
Erosion Rate (ton/ac/yr)													
Areas With Vegetation Treatment	3.1	4.7	1.1	4.7	1.1	-	-	4.9	0.7	4.9	0.9	3.9	1.2
Areas Without Vegetation Treatment	3.1	3.1	2.3	3.1	2.3	3.1	3.1	3.1	1.1	3.1	1.6	3.1	3.1
Soil Compaction (% change)													
Areas with Vegetation Treatment	-	0	dec. 32	0	dec. 32	0	0	0	dec. 44	0	dec. 36	0	dec. 28
Areas without Vegetation Treatment	-	0	dec. 8	0	dec. 8	0	0	0	dec. 31	0	dec. 20	0	0
Total Erosion (tons/yr)	929,129	1,084,601	569,466	1,084,601	569,466	929,129	959,101	991,812	299,719	1,129,753	389,635	1,090,693	569,466
WATER RESOURCES													
Surface runoff (ac-ft/sq mi/6 mo)													
With Vegetation Treatment	.2510	.3142	.0574	.3142	.0574	-	-	.3211	.0162	.3211	.0342	.2830	.1046
Without Vegetation Treatment	.2510	.1852	.2510	.1852	.2510	.2510	.2523	.2510	.0926	.2510	.1317	.2510	.2551
Infiltration Capacity (in/hr)													
With Vegetation Treatment	1.91	1.61	2.52	1.61	2.52	-	-	1.58	2.75	1.58	2.59	1.76	2.44
Without Vegetation Treatment	1.91	2.07	1.91	2.07	1.91	1.91	1.90	1.91	2.52	1.91	2.30	1.91	1.90
Total Surface Runoff (ac/ft/6 mo grazing season)	117	127	68	127	68	117	118	121	12	130	45	127	72

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* S/T = short term--1981 to 1989 implementation period; for comparative purposes the midpoint of 1985 is used.
** L/T = long term--2005, 20 years after implementation, when management objectives are being met.

IMPACT COMPARISON TABLE
(continued)

Impact	Present Situation	MFP Step II Spring Rest		Fall Rest		No Action		Elimination of Livestock Grazing		Optimize Wildlife and Watershed		Optimize Livestock Grazing	
		S/T *	L/T **	S/T	L/T	S/T	L/T	S/T	L/T	S/T	L/T	S/T	L/T
TERRESTRIAL WILDLIFE													
Big Game													
Wildlife Use (AUMs)	36,141	34,200	48,527	34,200	54,799	36,141	32,583	57,997	96,848	57,983	98,977	17,386	26,180
Population (number of animals)													
Elk - Winter	8,500	8,000	9,000	8,000	9,000	8,500	6,800	8,500	12,800	8,500	12,800	4,000	4,000
- Summer	2,700	2,700	3,300	2,700	3,300	2,700	2,200	2,700	4,100	2,700	4,100	1,300	1,300
- Yearlong	200	140	210	140	210	200	160	200	300	200	300	100	100
Mule Deer - Winter	15,800	15,800	22,000	15,800	22,000	15,800	12,600	15,800	25,300	15,800	25,300	9,500	9,500
- Summer	5,100	5,100	7,750	5,100	7,750	5,100	4,100	5,100	6,600	5,100	6,600	3,100	3,100
Pronghorns - Yearlong	150	200	500	200	500	150	300	150	640	150	640	100	100
Bighorn Sheep - Winter	120	150	180	150	180	120	140	120	160	120	160	80	80
- Summer	140	175	210	175	210	140	160	140	190	140	190	90	90
- Yearlong	90	100	140	180	140	90	100	90	120	90	120	60	60
Mountain Goat - Winter	25	25	45	25	45	25	30	25	35	25	35	25	25
AQUATIC WILDLIFE													
Aquatic Habitat (stream miles)													
Excellent	30.2	30.2	30.2	30.2	30.2	30.2	0	30.2	56.7	30.2	37.8	30.2	0.0
Good	66.2	66.2	90.8	66.2	100.2	66.2	39.7	66.2	94.6	66.2	132.4	66.2	26.5
Fair	71.8	71.8	56.7	71.8	51.1	71.8	90.8	71.8	34.0	71.8	15.1	71.8	77.5
Poor	17.0	17.0	7.6	17.0	3.8	17.0	54.8	17.0	0.0	17.0	0.0	17.0	81.3
LIVESTOCK GRAZING													
Allowable Use (AUMs)	60,013	44,542	63,201	44,542	71,370	60,013	60,013	0	0	20,745	35,403	61,356	92,389
RECREATION													
Deer and Elk Hunting Opportunities (use/days)	82,277	79,472	101,527	79,472	101,527	82,277	65,700	82,277	127,300	82,277	127,300	43,172	43,172

TABLE 2-9

IMPACT COMPARISON TABLE
(continued)

Impact	Present Situation	MFP Step II Spring Rest		Fall Rest		No Action		Elimination of Livestock Grazing		Optimize Wildlife and Watershed		Optimize Livestock Grazing	
		S/T *	L/T **	S/T	L/T	S/T	L/T	S/T	L/T	S/T	L/T	S/T	L/T
ECONOMICS													
Total Ranch Income ($1,000/yr)	9,640.1	8,535.5	9,862.7	8,535.5	10,478.2	9,640.1	9,640.1	3,690.2	3,690.2	6,539.3	7,832.4	9,945.5	11,856.2
Net Ranch Income ($1,000/yr)	-208.4	-554.5	-73.3	-554.5	218.1	-208.4	-208.4	-2,112.7	-2,112.7	-1,249.4	-1,051.9	23.7	711.5
Ranch Employment (person/yr)	173.0	164.9	183.8	164.9	185.5	173.0	173.0	140.7	140.7	151.4	162.3	173.7	196.1
Ranch Capital Values ($1,000)	143,430	139,557	144,227	139,557	146,268	143,430	143,430	125,427	125,427	133,613	137,277	143,766	151,524
Tax Assessed Valuation Real and Personal Property ($1,000/yr)	46,454	46,260	46,494	46,260	46,596	46,754	46,754	45,553	45,553	45,963	46,146	46,470	46,859
Tax Revenue ($1,000/yr)	3,114.6	3,101.6	3,117.3	3,101.6	3,124.1	3,114.6	3,114.6	3,054.3	3,080.8	3,087.4	3,094.0	3,115.8	3,141.7
Deer and Elk Hunting Income ($1,000/yr)	2,841.0	2,744.2	3,305.7	2,744.2	3,505.7	2,841.0	2,268.6	2,841.0	4,395.7	2,841.0	4,395.7	1,490.7	1,490.7
BLM Employment (work months)	220	488	1,950	488	1,950	220	880	95	380	431	1,722	560	2,240
Cost to Implement Alt ($1,000)	-	3,452.9		3,452.9		0		473.6		1,938.4		4,168.4	
Annual Maintenance Cost ($1,000)			84.9		84.9		0		14.9		64.0		146.8

CHAPTER 3

AFFECTED ENVIRONMENT

Climate

The climate in the EIS area is that of a mountainous region, characterized by low humidity, abundant sunshine, and cool temperatures.

The mean annual temperature in Gunnison is 37 degrees (all temperatures Fahrenheit), averaging 10 degrees in January and 62 degrees in July. The mean annual temperature in Crested Butte is 35 degrees and that in Lake City is 39 degrees.

About half of the total annual precipitation occurs from June through September; the remainder occurs as snow from October through May. In lower elevations, the annual precipitation averages 10 inches at Gunnison, 14 inches at Lake City, and 11 inches at Powderhorn. Because of topographic influences, precipitation amounts are generally greater at higher elevations, as can be seen by averages at Crested Butte--27 inches, Sapinero--21 inches, and Silverton--25 inches.

The average growing season length (days between occurrences of 28 degree temperatures) is 93 days in Gunnison, 117 days in Sapinero, and 84 days in Crested Butte. Since temperatures decrease with increases in altitude, higher elevation areas of the EIS area would be expected to have shorter growing seasons.

Air Quality

Because of the area's low population density and lack of industrial development, the air quality is presently good, approximating other non-urbanized mountainous areas in the west. The suspended particulate and carbon monoxide levels in Gunnison and Crested Butte show increases due to unpaved roads, road construction, and fireplace use. Elsewhere in the area, air quality measurements should be well within standards.

Geology, Minerals, Topography

Formations of all major geologic ages are present in and adjacent to the EIS area. This diversity gives rise to the variety of mineral resources and landforms found in the area. Historically, gold, silver, lead, zinc, and coal have been mined in the area, and presently, molybdenum, uranium, and titanium are drawing interest.

In the Gunnison area, the topography is characterized by a broad structural basin bounded by mountain ranges. The American Flats/Silverton area is composed of rugged mountain ranges and high mountain tundra. Elevations in the EIS area range from 6,700-foot sagebrush hills to 14,000-foot mountains. The generalized topography of the area is uneven, with deeply cut canyons, rolling hills, mountains, and basins. More specific topographic information may be found in resource sections that are affected by it.

Vegetation

VEGETATION TYPES

The natural vegetation in the EIS area consists of a mosaic of several vegetation types. Each type is characterized by one or two conspicuous dominant plant species, or an association of several codominant species. The dominant plant species and/or characteristic plant association of each vegetation type is listed in Appendix V-1.

The distribution of the vegetation types in the EIS area is correlated mainly to natural factors such as relative annual precipitation levels and moisture content of the soil. These factors in turn are affected by altitude (annual precipitation increases with elevation), temperature (lower temperatures result in less evaporation from the soil, and less evapotranspiration from plants), steepness (steep slopes are more droughty, due to increased runoff and less moisture infiltration into the soil), aspect (south-facing slopes are more droughty than north-facing slopes), wind (wind increases evaporation and evapotranspiration), vegetation cover (vegetation modifies the evaporative effects of wind and temperature), and the nature of the substrate (coarse substrates hold less moisture than fine substrates). Table 3-1 shows the approximate range in elevation and annual precipitation for each of the vegetation types, as well as their extent (in acres) on public land in the EIS area. It should be realized that the vegetation types overlap somewhat in the elevation and precipitation ranges, mainly due to the varying microenvironmental conditions of north- and south-facing aspects. Vegetation types adapted

TABLE 3-1

APPROXIMATE ANNUAL PRECIPITATION LEVELS, ELEVATION RANGES, AND EXTENT OF THE MAJOR VEGETATION TYPES ON PUBLIC LAND IN THE EIS AREA

Vegetation Type	Extent (acres)	Elevation (feet)	Annual Precipitation (inches)
Sagebrush	215,400	7,000-9,000	10-20
Mountain Shrub	3,100	7,000-8 500	12-20
Ponderosa Pine-Douglas Fir	46,100	7,000-9,000	14-20
Aspen	64,200	7,000-11,000	14-35
Meadow	22,400	7,000-11,000	14-35
Spruce-fir	130,600	8,000-11,000	20-35
Alpine	96,600	greater than 11,000	greater than 35
Barren	58,800		

to the relatively drier sites of lower elevations may extend higher by way of dry southern slopes and vice versa. Map 3 (Support Data) shows the distribution of vegetation types within the EIS area.

Man has also influenced vegetation distribution. Two prime examples are recent control of wildfire and the introduction of foreign grazing animals. Woody species such as sagebrush or conifers have generally become more dense due to the absence of periodic fires on range and forested land. Heavy grazing also has resulted in increased density of woody species, due to the suppression of desirable grass species which compete with the woody plants. The end result in both cases has been conversion of mixed shrub-grass or forested-grass plant communities to more dense shrub or forest communities. These same trends are evidenced in much of the Western United States (Hull and Hull 1974; Marquis and Lang 1959).

Sagebrush

The sage brush zone occupies more area than any of the other vegetation types in the Gunnison Basin (Figure 3-1). It has been estimated that one-third of the Gunnison Basin is covered by big sagebrush (Barrell 1969). Mountain big sagebrush (*Artemisa tridentada vaseyana*) predominates. In localized areas other sagebrush species (black sage, silver sage, Rothrock sage) may replace big sagebrush as the dominant plant.

The sagebrush type is usually bordered by the moist meadows of drainages at its lower limit, and by aspen, mountain shrub, or ponderosa pine-Douglas fir at its upper limits. Sagebrush may rarely contact spruce-fir or lodgepole pine at its upper limit (Figure 3-2).

Mountain Shrub

The mountain shrub zone is most developed in the western section of the Gunnison Basin, where it occurs above the sagebrush zone. Occasionally mountain shrub vegetation will occur on protected north-facing slopes within the sagebrush zone.

Mountain shrub vegetation consists of a number of shrub species (serviceberry, snowberry, chokecherry, etc.), but is dominated by Gambel oak.

Ponderosa Pine-Douglas Fir

The ponderosa pine-Douglas fir vegetation type is actually composed of two rather distinct subtypes that occur in the same altitudinal range, but which occupy areas with different environmental conditions. Ponderosa pine grows at approximately 7,000 to 9,000 feet, on relatively dry mesas and south-facing slopes (Figure 3-3). The Douglas fir subtype is most well developed at the same elevation, but occupies areas which are more moist--usually protected north-facing slopes. Bristlecone pine may also occur near the upper limit of the ponderosa pine-Douglas fir type, usually on dry, south-facing slopes.

Aspen

Aspen occurs as a stable, rather continuous forest belt in the EIS area between 9,500 and 10,500 feet, although it extends as low as 8,500 feet and as high as 11,200 feet (Figures 3-4, 3-5). Understory vegetation beneath aspen is typically very lush and consists of a large diversity of grasses and forbs.

The aspen type is sometimes a successional stage, invading areas that have been burned or logged. Aspen may also occasionally invade mountain meadows dominated by fescue.

In the EIS area, aspen may extend down into the sagebrush or ponderosa pine vegetation zones via north-facing slopes. It is often associated with Douglas fir on the north slopes.

Meadows

Meadows are common in the woodlands of the lower mountains and subalpine areas in the EIS area (Figures 3-4, 3-6). The plant composition of the meadows varies with elevation, associated vegetation types, and relative moisture content of the soil. Dry meadows in the lower mountains (with or near ponderosa pine-Douglas fir) often include Arizona fescue, Columbia needlegrass, oatgrass, mountain muhly, junegrass, pine dropseed, western yarrow, and harebell. In subalpine areas (among spruce-fir or aspen) Thurber's fescue, Idaho fescue, rough bentgrass, alpine timothy, spike trisetum, orange sneezeweed, and cinquefoil may also be present. Wet meadows consist of tufted hairgrass, reedgrass, buttercups, marsh marigolds, shrubby cinquefoil, and a variety of sedges and rushes. They are often associated with the riparian zone.

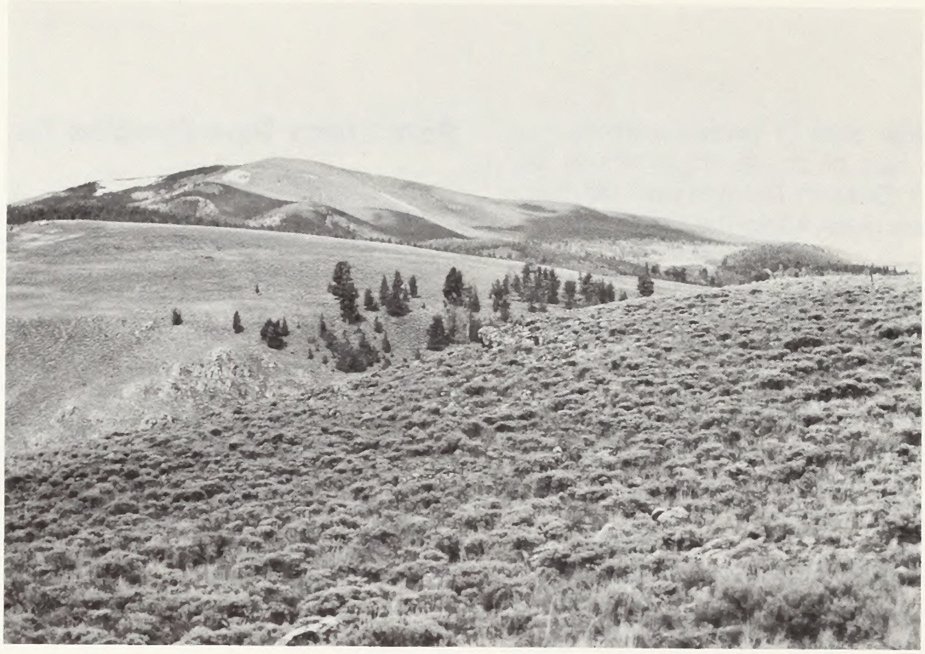

Figure 3-1. Sagebrush vegetation type (south of Doyleville).

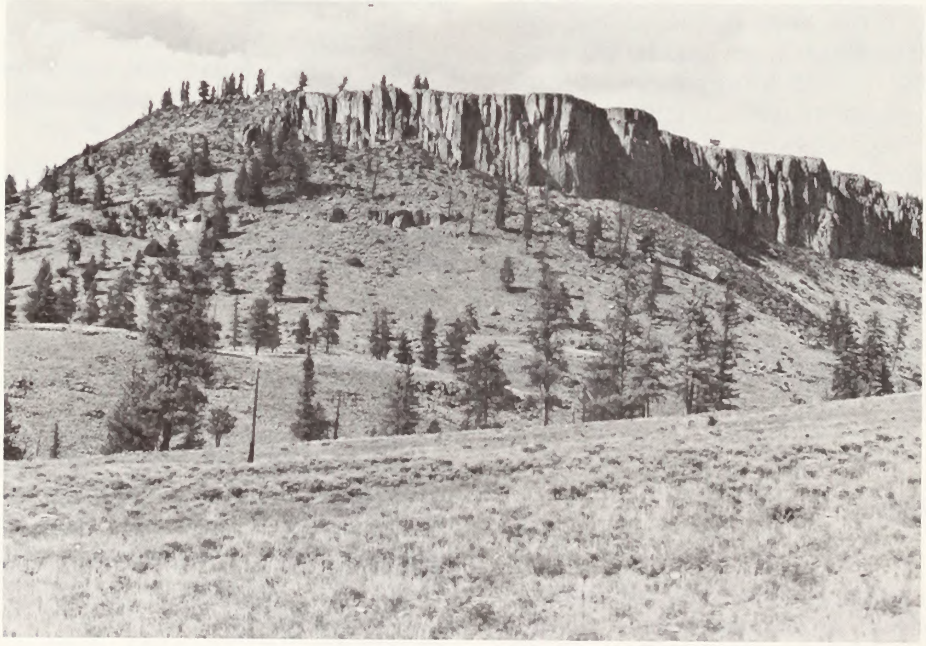

Figure 3-2. Mixed ponderosa pine-sagebrush vegetation type (north of Cathedral).

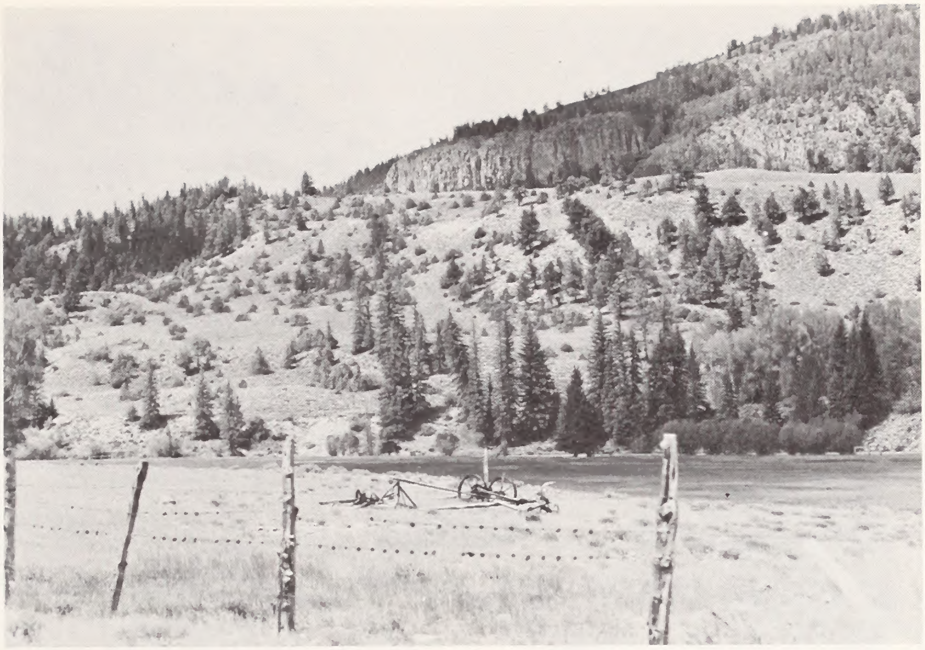

Figure 3-3. Mountain meadow range site on private land near river, and ponderosa pine-Douglas fir vegetation type on slopes (Lake Fork of the Gunnison River).

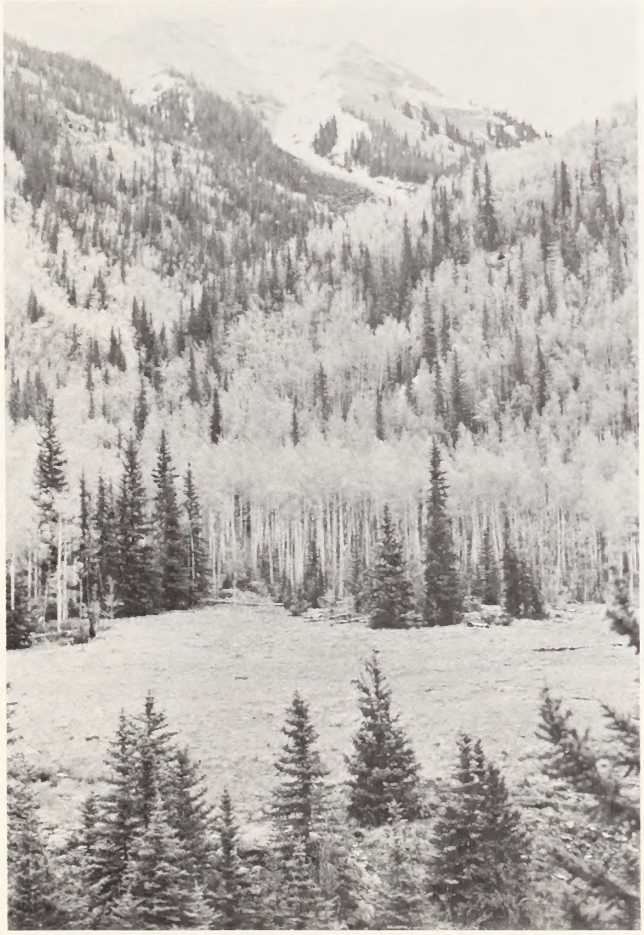

Figure 3-4. Subalpine loam range site, mixed spruce-fir and aspen forest, and the alpine zone (near Capitol City townsite).

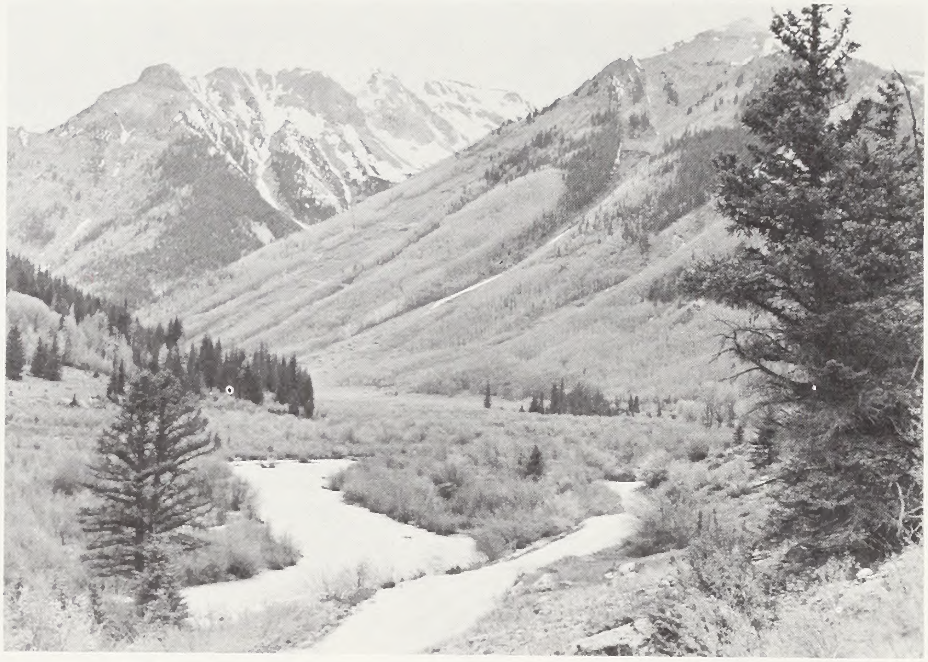

Figure 3-5. Riparian zone, aspen and spruce-fir forests, timberline, and the alpine zone (Henson Creek Canyon, west of Lake City).

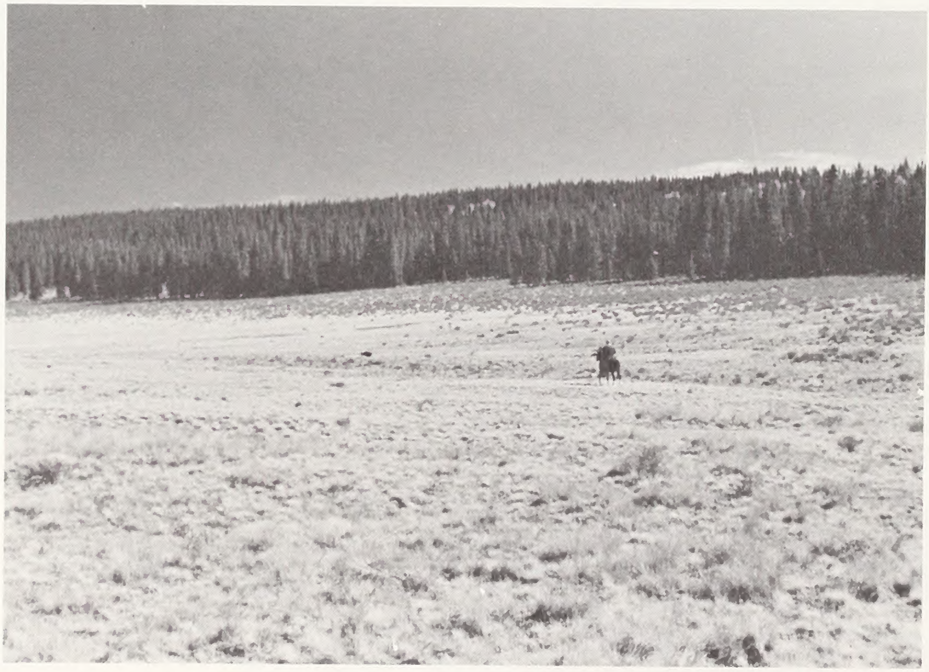

Figure 3-6. Subalpine loam range site and spruce-fir forest (Powderhorn Park).

Lodgepole Pine

The Gunnison Basin is near the southernmost geographical distribution of lodgepole pine and consequently lodgepole pine is not very abundant in the EIS area (Langenheim). Lodgepole pine typically is scattered throughout subalpine areas between 8,500 and 11,000 feet. It is largely found on old burns, where it is a subclimax tree and may eventually be replaced by spruce-fir. Very little lodgepole pine occurs in the south half of the Basin, where the bulk of public land is located.

Spruce-Fir

The spruce-fir type consists of Engelmann spruce and subalpine fir in rather dense stands (Figure 3-7). Engelmann spruce is the dominant tree of this type, with subalpine fir of lesser abundance (largely due to Engelmann spruce's longevity). The spruce-fir forest is characterized by an unevenness in the age of the trees, along with numerous standing dead trees, and the forest floor is littered with dead trunks of all sizes and in varying degrees of decomposition (Langenheim).

Spruce-fir is present at altitudes between 8,500 to 12,000 feet. It occupies only the north slopes at its lower altitudinal limit, and at the upper limit, which is timberline, the trees become dwarfed and contorted. Spruce-fir is the dominant vegetation type between 10,000 and 11,500 feet.

Alpine

The alpine type begins at timberline, where twisted, contorted Engelmann spruce and subalpine fir, collectively called Krummholz, are present (Figures 3-8, 3-9). It extends from approximately 11,000 feet to the summits of high peaks, above 14,000 feet. The vegetation of the alpine type is typically dense, with less than 5 percent bare ground.

The lower 1,000 to 2,000 feet of the alpine zone is characterized by tall grasses, sedges, and erect forbs. In the higher portions of the alpine zone, above approximately 12,000 feet, an abundance of cushion, rossete, mat, and low-tufted plants occur.

Kobresia, a sedge-like plant, covers large areas above timberline, mainly on windswept ridges.

Boulder fields and talus slopes are common within the alpine zone. Vegetation is very sparse on these substrates.

A plant species may vary in size considerably from the lower edge of the alpine zone to the upper edge. An example is alpine timothy, which may be 35 to 40 centimeters tall near timberline, and just 10 to 15 centimeters tall at 13,000 feet elevation.

Riparian

The riparian vegetation type occurs along the many rivers and streams within the EIS area. Plants commonly associated with watercourses in the Gunnison Basin are willows, alders, and birches. Narrowleaf cottonwood is present along rivers and streams at the lower elevations in the EIS area (Figures 3-3, 3-5, 3-10). Colorado blue spruce may be an important riparian component between 7,000 and 9,500 feet. Cattails, sedges, rushes, bulrushes, spikerushes, and Kentucky bluegrass occur adjacent to watercourses in areas with ground water very near the surface.

A 1978 range survey of the streambank vegetation on public land in the EIS area found 3 percent (6.06 miles) in declining trend, 19 percent (35.23 miles) in stable trend, and 78 percent (143.31 miles) in improving trend. The criteria used to obtain the trend data were similar to those used to obtain vegetation condition data, and trend data are indicative of vegetation condition (acres good, fair, or poor). In obtaining the trend data, reproduction of major species of the potential plant community was analyzed, plant residue and utilization were rated, composition changes in the potential community (increase or decrease) were observed, and data on plant vigor and soil erosion were gathered.

The mountain meadow range site corresponds with the riparian zone, since both areas are naturally subirrigated. Existing composition, production, cover, condition, and trend of the mountain meadow site are presented in Appendix V-2.

Annual Weeds

Disturbed areas exhibit a unique vegetation type of invader plants such as Russian thistle, bindweed, or Canada thistle. If no further disturbance occurs, the invader vegetation will succeed to a more stable vegetation type typical of the area.

RANGE SITES

An extensive 1978 range survey analyzed the vegetation in the EIS area in terms of range sites.

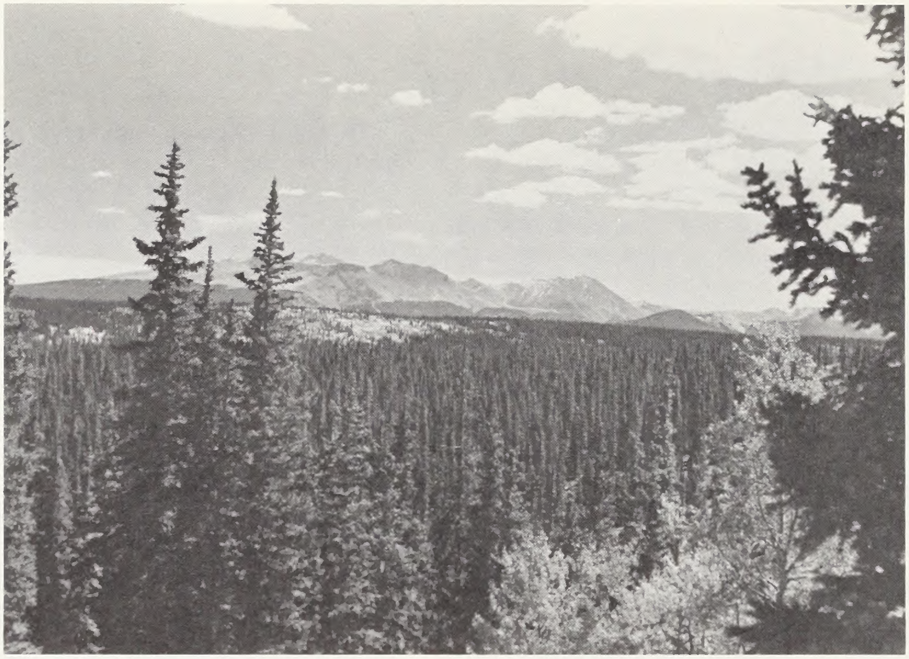

Figure 3-7. Dense spruce-fir forest (near Burnt Creek, in Powderhorn Primitive Area).

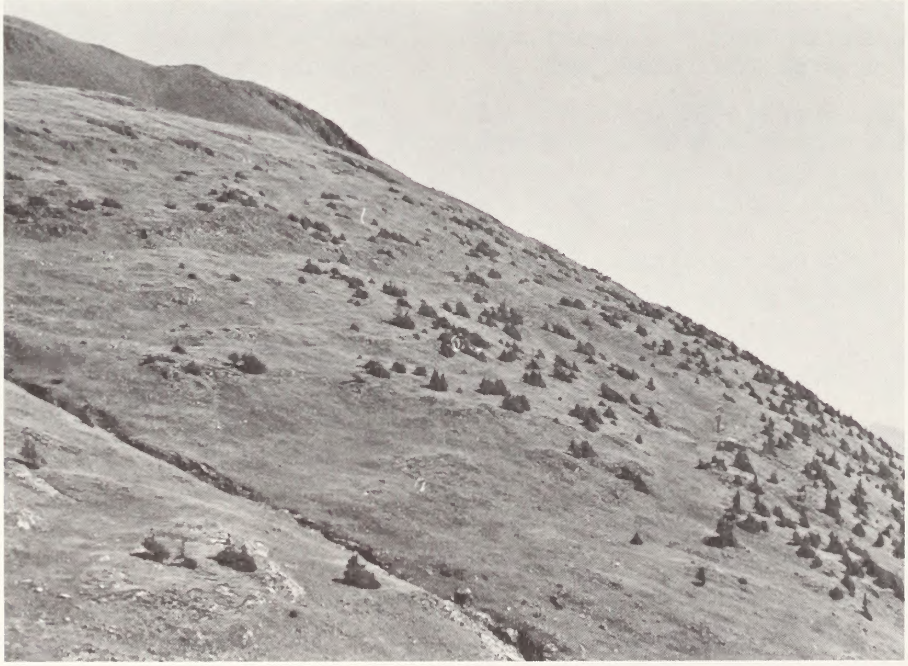

Figure 3-8. Twisted, contorted spruce and fir or "Krumholz" vegetation (northeast of Silverton).

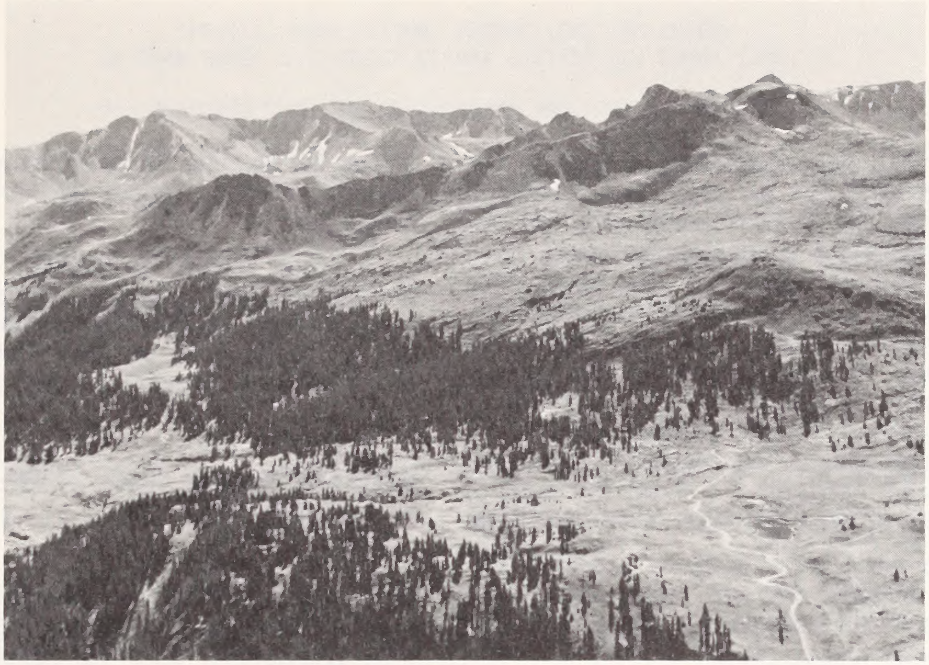

Figure 3-9. Spruce-fir forest, timberline, and the alpine zone (west of Engineer Pass).

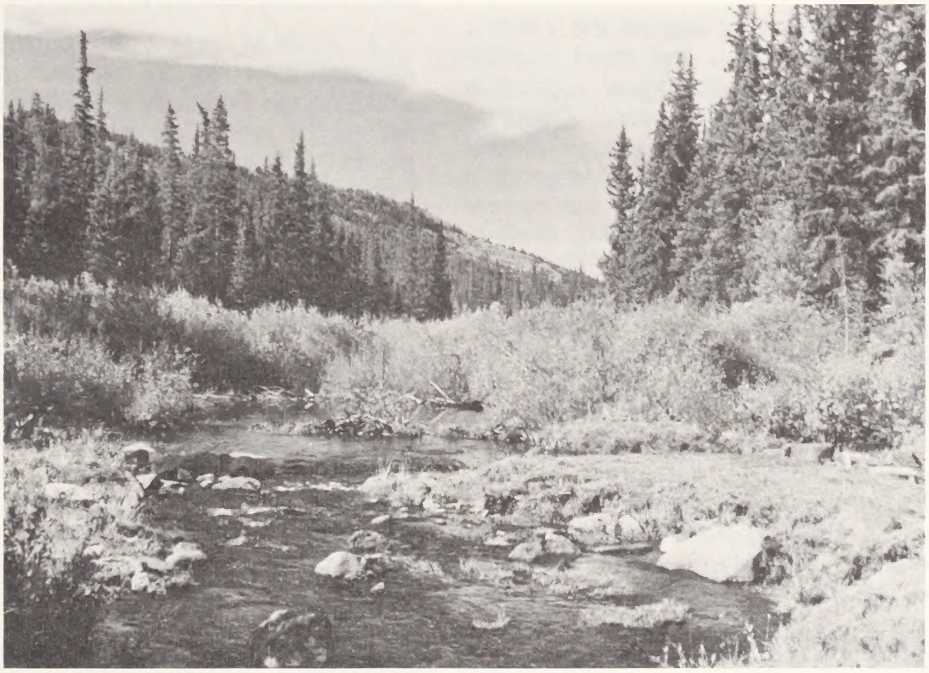

Figure 3-10. Riparian zone, dominated by willows and many species of grasses and forbs. Streambank sloughing is evident, resulting from cattle trampling (East Fork Powderhorn Creek).

A "range site" is a distinctive kind of rangeland that has a certain potential for producing rangeland plants. Each site has its own combination of environmental conditions and characteristic plant community. Table 3-2 describes the nine range sites present in the EIS area in terms of potential species composition (percent), production (lbs/acre/year), and cover. The table represents the expected characteristics of each range site under climax (potential) conditions. Table 3-3 shows the relationship of the range sites to the vegetation types previously discussed. Appendix V-4 shows the acres of each range site in each allotment in the EIS area.

Densely forested areas, such as spruce-fir forests are not included within a range site. These areas often have little potential for livestock grazing due to the dense timber, related scarcity of herbaceous understory, and steep slopes.

EXISTING VEGETATION CONDITION AND TREND

The 1978 range survey evaluated the existing ecological vegetation condition and trend on nine range sites in the EIS area. Ecological vegetation condition is defined as the present state of vegetation of a range site in relation to the climax (natural potential) for that range site. Existing vegetation condition was measured by comparing the current percent species composition (by weight), production (lbs/acre/year), and cover (percent basal and canopy) of a range site with the potential species composition, production, and cover for that range site. The further the range site deviated from the potential, the worse condition that range site was in, and vice versa. Appendix V-2 shows the existing vegetation condition, species compositon (percent, by weight, for grass species, sagebrush species, and/or forb species), and cover (percent basal), for each of the range sites. Fourteen percent of the range sites were found to be in good condition, 47 percent in fair condition, and 39 percent in poor condition. No areas of any range sites were found to be in excellent condition.

Vegetation trend is defined as the direction of change in condition of the vegetation of a range site. Trend may be upwards, static, or downwards. During the 1978 range survey, trend was measured by evaluating plant composition changes, abundance of seedlings and young plants, plant litter (residues), plant vigor, and the condition of the soil surface. Since accurate vegetation trend can only be achieved by observing vegetation changes over several seasons, the data obtained in the 1978 survey must be defined as apparent trend, since they were obtained in one season. Appendix V-2 shows the existing apparent trend for each of the condition classes (good, fair, and poor) in each range site.

A more detailed explanation of the inventory procedures used to obtain the existing vegetation condition and trend on range sites in the EIS area can be reviewed in the Soil Conservation Service *National Range Handbook*.

ENDANGERED AND THREATENED PLANTS

Five plants which are proposed endangered in the *Federal Register* (*Federal Register* Vol. 41, No. 127; Wednesday, June 16, 1976) occur on public land in the EIS area. These are *Arabis gunnisoniana, Astragalus microcymbus, Cryptantha weberi, Senecio porteri,* and *Stellaria irrigua*. In addition, *Gilia penstemonoides*, a plant which has no federal status, but which is on a list of endangered and threatened plant species of the Colorado Native Plant Society, occurs in the EIS area.

It is BLM policy, as outlined by Instruction Memorandum No. 79-64, to,"...protect, conserve, and manage Federally and State-listed or proposed listings of sensitive, endangered, or threatened plants." It is also BLM policy to, "...ensure that the habitats of sensitive plants will be managed and/or conserved to minimize or eliminate the need for Federal or State listing in the future."

The proposed endangered plants in the EIS area will likely be removed from the proposed list of endangered plant species in the *Federal Register* in November, 1979, due to recent amendments to the Endangered Species Act. The amendments state that if proposed species do not receive a final listing within 2 years of when they were first proposed, the species will be dropped from the proposed list. Currently proposed species were given a 1 year grace period, ending on November 11, 1979. The U.S. Fish and Wildlife Service (the lead federal agency responsible for implementation of the Endangered Species Act) has not indicated that they plan to list any of the proposed endangered plant species in the EIS area by November 11.

The BLM will consider the proposed endangered species in the management of public lands even if the species are dropped from the proposed list in the *Federal Register*, as is expected. This is because the species fulfill the definition of "sensitive" plant species as "species whose populations are consistently small and widely dispersed, or whose ranges are restricted to a few localities, such that any appreciable reduction in numbers, habitat availability, or habitat condition might lead

TABLE 3-2 Part A

SPECIES, COMPOSITION, PRODUCTION, AND COVER
OF EACH RANGE SITE UNDER CLIMAX (POTENTIAL) CONDITIONS:

DRY MOUNTAIN LOAM, MOUNTAIN LOAM, AND MOUNTAIN OUTWASH

SPECIES COMPOSITION (PERCENT BY WEIGHT)

Dry Mountain Loam	Mountain Loam	Mountain Outwash
GRASSES AND GRASSLIKE:	GRASSES AND GRASSLIKE:	GRASSES:
Muttongrass...............15 (Poa fendleriana)	Arizona fescue...........15 (Festuca arizonica)	Arizona fescue...........20 (Festuca arizonica)
Western wheatgrass........15 (Agropyron smithii)	Western wheatgrass........10 (Agropyron smithii)	Mountain muhly............10 (Muhlenbergia montana)
Pine needlegrass..........10 (Stipa pinetorum)	Nodding brome.............5 (Bromus anomalus)	Indian ricegrass..........10 (Oryzopsis hymenoides)
Needle-and-thread.........5 (Stipa comata)	Mountain brome............5 (Bromus carinatus)	Muttongrass...............10 (Poa fendleriana)
Squirreltail..............5 (Sitanion hystrix)	Bearded wheatgrass.........5 (Agropyron subsecundum)	Western wheatgrass.........5 (Agropyron smithii)
Indian ricegrass..........3 (Oryzopsis hymenoides)	Slender wheatgrass.........5 (Agropyron trachycaulum)	Junegrass.................5 (Koeleria cristata)
Sandberg bluegrass........3 (Poa sandbergii)	Junegrass.................5 (Koeleria cristata)	Squirreltail..............5 (Sitanion hystrix)
Slimstem muhly............2 (Muhlenbergia filiculmis)	Mountain muhly............5 (Muhlenbergia montana)	Blue grama................2 (Bouteloua gracilis)
Elk sedge.................2 (Carex geyeri)	Muttongrass...............5 (Poa fendleriana)	Slimstem muhly............2 (Muhlenbergia filiculmis)
Others....................5	Squirreltail..............5 (Sitanion hystrix)	Letterman needlegrass......2 (Stipa lettermanii)
	Elk sedge.................3 (Carex geyeri)	
	Others....................5	
FORBS:	FORBS:	FORBS:
Indian paintbrush..........3 (Castilleja linariaefolia or C. chromosa)	American vetch............2 (Vicia americana)	Cinquefoil................2 (Potentilla sp.)
Sulphur buckwheat..........2 (Eriogonum umbellatum)	Indian paintbrush..........2 (Castilleja linariaefolia or C. chromosa)	Indian paintbrush..........2 (Castilleja linariaefolia)
Hairy goldaster...........1 (Heterotheca villosa)	Silvery lupine............1 (Lupinus argenteus)	Fremont geranium..........2 (Geranium fremontii)
Hoods phlox...............1 (Phlox hoodii)	Cinquefoil................1 (Potentilla sp.)	Rose pussytoes............1 (Antennaria rosea)
Others....................3	Sulphur buckwheat.........1 (Eriogonum umbellatum)	Others....................4
	Western yarrow............1 (Achillea lanulosa)	
	Others....................2	

TABLE 3-2 Part A

SPECIES, COMPOSITION, PRODUCTION, AND COVER OF EACH RANGE SITE UNDER CLIMAX (POTENTIAL) CONDITIONS:

DRY MOUNTAIN LOAM, MOUNTAIN LOAM, AND MOUNTAIN OUTWASH
(continued)

Dry Mountain Loam	Mountain Loam	Mountain Outwash
SPECIES COMPOSITION (PERCENT BY WEIGHT) (cont.)		
SHRUBS:	SHRUBS:	SHRUBS:
Big sagebrush.............15 (*Artemisia tridentata vaseyana*)	Big sagebrush.............10 (*Artemisia tridentata vaseyana*)	Fringed sagebrush..........8 (*Artemisia frigida*)
Antelope bitterbrush.......5 (*Purshia tridentata*)	Snowberry..................3 (*Symphoricarpos oreophilus*)	Douglas rabbitbrush........3 (*Chrysothamnus viscidiflorus*)
Douglas rabbitbrush........2 (*Chrysothamnus viscidiflorus*)	Douglas rabbitbrush........2 (*Chrysothamnus viscidiflorus*)	Big sagebrush..............3 (*Artemisia tridentata vaseyana*)
Others.....................3	Others.....................2	Wax currant................2 (*Ribes cereum*)
		Winterfat..................2 (*Ceratoides lanata*)
PRODUCTION (LBS/ACRE/YEAR)		
500 (dry years) - 1,000 (wet years)	1,200 - 1,800	600 - 1,000
COVER (PERCENT BASAL)		
35	35	25

TABLE 3-2 Part B

SPECIES, COMPOSITION, PRODUCTION, AND COVER
OF EACH RANGE SITE UNDER CLIMAX (POTENTIAL) CONDITIONS:

MOUNTAIN SWALE, MOUNTAIN MEADOW, AND PINE GRASSLAND

Mountain Swale	Mountain Meadow	Pine Grassland
SPECIES COMPOSITION (PERCENT BY WEIGHT)		
GRASSES:	GRASSES AND GRASSLIKE:	GRASSES AND GRASSLIKE:
Western wheatgrass........55 (*Agropyron smithii*)	Tufted hairgrass..........45 (*Deschampsia caespitosa*)	Arizona fescue...........10 (*Festuca arizonica*)
Basin wildrye............10 (*Elymus cinereus*)	Slender wheatgrass........10 (*Agropyron trachycaulum*)	Mountain muhly...........10 (*Muhlenbergia montana*)
Slender wheatgrass.........3 (*Agropyron trachycaulum*)	Nebraska sedge...........10 (*Carex nebraskensis*)	Wheatgrass...............10 (*Agropyron* sp.)
Nodding brome..............3 (*Bromus anomalus*)	Baltic rush................5 (*Junius balticus*)	Junegrass................10 (*Koeleria cristata*)
Bearded wheatgrass.........2 (*Agropyron subsecundum*)	Ovalhead sedge............2 (*Carex festivella*)	Blue grama...............10 (*Bouteloua gracilis*)
Others.....................5	Reedgrass..................2 (*Calamagrostis* sp.)	Sedge....................10 (*Carex* sp.)
	Foxtail barley............2 (*Hordeum jubatum*)	Others...................10
	Others.....................2	
FORBS:	FORBS:	FORBS:
Silvery lupine............5 (*Lupinus argenteus*)	American bistort..........5 (*Polygonum bistortoides*)	American vetch...........10 (*Vicia americana*)
Greenleaf bluebells........3 (*Mertensia viridis*)	Wild parsley..............2 (*Pseudocymopterus*)	Western yarrow............1 (*Achillea lanulosa*)
Rocky Mountain iris........3 (*Iris missouriensis*)	Cow parsnip...............2 (*Heracleum lanatum*)	Cinquefoil.......... .....1 (*Potentilla* sp.)
Cinquefoil.................2 (*Potentilla* sp.)	Cinquefoil................2 (*Potentilla* sp.)	Sulphur buckwheat..........2 (*Eriogonum umbellatum*)
Others.....................2	Rocky Mountain iris........1 (*Iris missouriensis*)	Fleabane..................1 (*Erigeron* sp.)
	Elephanthead lousewort.....1 (*Pedicularis groenlandica*)	Geranium..................1 (*Geranium* sp.)
	Others.....................5	Pussytoes.................1 (*Antennaria* sp.)
		Others....................2

TABLE 3-2 Part B

SPECIES, COMPOSITION, PRODUCTION, AND COVER OF EACH RANGE SITE UNDER CLIMAX (POTENTIAL) CONDITIONS:

MOUNTAIN SWALE, MOUNTAIN MEADOW, AND PINE GRASSLAND
(continued)

Mountain Swale	Mountain Meadow	Pine Grassland
SPECIES COMPOSITION (PERCENT BY WEIGHT) (cont.)		
SHRUBS:	SHRUBS:	SHRUBS:
Snowberry..................3 (*Symphoricarpos oreophilus*)	Willow....................2 (*Salix* sp.)	Fringed sage...............5 (*Artemisia frigida*)
Big sagebrush.............2 (*Artemisia tridentata vaseyana*)	Shrubby cinquefoil........2 (*Potentilla fruiticosa*)	Mountain mahoghany.........1 (*Cercocarpus montanus*)
Serviceberry..............2 (*Amelanchier alnifolia* or *A. urahensis*)		Snowberry..................1 (*Symphoricarpos oreophilus*)
		Antelope bitterbrush.......1 (*Purshia tridentata*)
		Douglas rabbitbrush........1 (*Chrysothamnus viscidiflorus*)
		Others.....................3
PRODUCTION (LBS/ACRE/YEAR)		
2,000 (dry years) - 3,000 (wet years)	2,000 - 4,000	750 - 950
COVER (PERCENT BASAL)		
50		35

TABLE 3-2 Part C

SPECIES, COMPOSITION, PRODUCTION, AND COVER OF EACH RANGE SITE UNDER CLIMAX (POTENTIAL) CONDITIONS:

SHALLOW SUBALPINE, SUBALPINE LOAM, AND ALPINE SLOPES

Shallow Subalpine	Subalpine Loam	Alpine Slopes
SPECIES COMPOSITION (PERCENT BY WEIGHT)		
GRASSES:	GRASSES:	GRASSES AND GRASSLIKE:
Arizona fescue............25 (*Festuca arizonica*)	Thurber fescue............45 (*Festuca thurberi*)	Kobresia..................20 (*Kobresia myosuroides*)
Mountain muhly............20 (*Muhlenbergia montana*)	Parry oatgrass............10 (*Danthonia parryi*)	Sedges....................10 (*Carex* sp.)
Muttongrass...............15 (*Poa fendleriana*)	Nodding brome..............5 (*Bromus anomalus*)	Alpine bluegrass...........5 (*Poa alpina*)
Letterman needlegrass......5 (*Stipa lettermannii*)	Bearded wheatgrass.........5 (*Agropyron subsecundum*)	Tufted hairgrass...........5 (*Deschampsia caespitosa*)
Thurber fescue.............5 (*Festuca thurberi*)	Muttongrass................5 (*Poa fendleriana*)	Scribner wheatgrass........3 (*Agropyron scribneri*)
Others.....................5	Columbia needlegrass.......3 (*Stipa columbiana*)	Baker wheatgrass...........2 (*Agropyron bakeri*)
		Spike trisetum.............2 (*Trisetum spicatum*)
		Others.....................3
FORBS:	FORBS:	FORBS:
Silvery lupine.............2 (*Lupinus argenteus*)	American vetch.............3 (*Vicia americana*)	Alpine clover..............5 (*Trifolium parryi* or *T. nanum*)
Fleabane...................2 (*Erigeron* sp.)	Aspen peavine..............3 (*Lathyrus leucanthus*)	American bistort...........5 (*Polygonum bistortoides*)
Sulphur buckwheat..........1 (*Eriogonum umbellatum*)	Fleabane...................2 (*Erigeron* sp.)	Cinquefoil.................3 (*Potentilla* sp.)
Indian paintbrush..........1 (*Castilleja* sp.)	Lupine.....................2 (*Lupinus* sp.)	Western yarrow.............2 (*Achillea lanulosa*)
Hairy goldaster............1 (*Heterotheca villosa*)	Fremont geranium...........1 (*Geranium fremontii*)	Bluebells..................2 (*Mertensia* sp.)
Rose pussytoes.............1 (*Antennaria rosea*)	Sidebells penstemon........1 (*Penstemon secundiflorus*)	
Others.....................2	Others.....................5	

TABLE 3-2 Part C

SPECIES, COMPOSITION, PRODUCTION, AND COVER OF EACH RANGE SITE UNDER CLIMAX (POTENTIAL) CONDITIONS:

SHALLOW SUBALPINE, SUBALPINE LOAM, AND ALPINE SLOPES
(continued)

Shallow Subalpine	Subalpine Loam	Alpine Slopes
SPECIES COMPOSITION (PERCENT BY WEIGHT) (cont.)		
SHRUBS:	SHRUBS:	SHRUBS:
Silver sagebrush..........10 (*Artemisia cana*)	Silver sagebrush...........4 (*Artemisia cana*)	Alpine willow.............20 (*Salix arctica*)
Fringed sagebrush..........3 (*Artemisia frigida*)	Snowberry..................3 (*Symphoricarpos oreophilus*)	Shrubby cinquefoil.........5 (*Potentilla fruticosa*)
Wax currant................2 (*Ribes cereum*)	Shrubby cinquefoil.........2 (*Potentilla fruticosa*)	Others.....................8
	Wild rose..................1 (*Rosa woodsii*)	
PRODUCTION (LBS/ACRE/YEAR)		
775 (dry years) - 2,500 (wet years)	2,000 - 3,500	500 - 1,200
COVER (PERCENT BASAL)		
45	50	50

TABLE 3-3

RELATIONSHIP OF VEGETATION TYPES TO RANGE SITES 1/

Vegetation types	Associated Range Sites
Sagebrush	Dry Mountain Loam Mountain Loam Mountain Outwash Mountain Swale
Ponderosa Pine/Douglas Fir	Pine Grassland
Meadow	Subalpine Loam Shallow Subalpine Mountain Meadow
Riparian	Mountain Meadow
Alpine	Alpine Slopes

1/ The mountain outwash and mountain swale range sites would correspond to the meadow vegetation type where big sagebrush invasion has not occurred. Also, in some areas the shallow subalpine, subalpine loam or mountain meadow range sites have been invaded by sagebrush or shrubby cinquefoil and resemble a shrub community.

The mountain meadow range site phenotypically resembles a meadow vegetation type, but it is also closely associated with the riparian zone, being naturally subirrigated.

toward extinction." (from BLM I.M. 79-64). As mentioned above, BLM is committed to manage for sensitive plant species in order to eliminate the need for the future listing of such species by the U.S. Fish and Wildlife Service.

Cryptantha weberi, Gilia penstemonoides, Senecio porteri, and *Stellaria irrigua* all occur on steep talus slopes or volcanic or metavolcanic cliffs in the EIS area. Since these areas produce little livestock forage, or are inaccessible to livestock, the plants are not impacted by livestock grazing, and will not be discussed in detail in the EIS. *Arabis gunnisoniana* and *Astragalus microcymbus* may be potentially impacted by livestock grazing.

Arabis gunnisoniana

Arabis gunnisoniana is a low tufted plant of the Mustard (Cruciferae) family. It has many slender stems from a perennial persistent base and small pink to purplish flowers. Long narrow seed pods develop after blooming, which are aligned at approximately right angles to the stem. The plant flowers in May and the seed pods mature and dehisce in June and early July. This historical range of *Arabis gunnisoniana* is within the sagebrush zone of the Gunnison Basin.

Extensive field inventories in 1978 and 1979 found *Arabis gunnisoniana* to be very widespread and abundant in the Gunnison Basin, in its favored habitat. *Arabis gunnisoniana* was found in many locations from approximately 10 miles east of Parlin to South Cochetopa Creek near Moss Lake, west to Powderhorn, and north to near Sapinero. The favored habitat of *Arabis gunnisoniana* is dry hillsides with shallow soil. The plant often occurs in soil too shallow and droughty to maintain sagebrush in dense stands. *Arabis gunnisoniana* is typically found with *Erigern pumilus, Gayophytum ramosissimum, Penstemon teucrioides* and *Sedum lanceolatum.*

Astragalus microcymbus

Astragalus microcymbus is a forb with long narrow stems which grow prostrate along the ground. It is a member of the Pea family (Leguminosae). Its leaves are finely divided, and its flowers are small and whitish tinged with lilac.

Astragalus microcymbus is apparently extinct at its type locality, which is along Highway 50 at the western limit of the floodplain of the Gunnison River, just before it enters the canyon at Hierro. The original collection was made at that site in 1945, with a second collection in 1955. All recent attempts to rediscover *Astragalus microcymbus* at its type locality have been unsuccessful. Two other populations, however, have been discovered. One is near South Beaver Creek, southwest of Gunnison, and one is near Powderhorn.

Astragalus microcymbus is utilized by grazing animals, but it is not felt that grazing is harmful to the plant (discussed in Chapter 4).

Soils

SOIL INVENTORIES

The majority of the Gunnison Basin portion of the EIS area is included in the Soil Conservation Service (SCS) Soil Survey of the Gunnison Area, Colorado. The small excluded acreage, occurring between the west edge of Range 5 West, New Mexico Principal Meridian, and the Cimarron River, does not have detailed information. This area was delineated into range sites by the 1978 range and wildlife inventory teams, based on best available data.

General soil maps for Hinsdale and San Juan counties were utilized to characterize the soils of the American Flats/Silverton portion of the EIS area. Detailed surveys are not presently available for this region.

SOIL TYPES AND PROPERTIES

Map 4 (Support Data) represents the distribution of broad soil associations in the EIS area. The Evanston-Gas Creek-Irim association is mainly private land used for irrigated hayland and pasture. The Parlin-Lucky-Hopkins association is the most extensive in the Gunnison Basin (45 percent) and is predominantly classified into the dry mountain loam and mountain loam range sites. Small but important areas of mountain swale range site also occupy this mapping unit. The Vulcan-Wetterhorn-Ruby association is mostly timbered with appreciable areas of shallow subalpine range site present. The Posant-Woodhall-Stony rockland association contains open stands of ponderosa pine and Douglas Fir classified as pine-grasslands range site. This range site has been discontinued by the SCS, but was utilized in the 1978 range and wildlife inventory. The Shule-Youman-Passer association mainly supports the subalpine loam range site with some forested portions. The Meredith-Rockslides association is principally occupied by the alpine slopes range site.

The soil associations in the American Flats/Silverton region are too general to correlate directly with range sites. However, using the data available and local expertise the range was classified as alpine slopes, except for the northeast extremity which was designated subalpine loam range site (1978 range and wildlife inventory). Small acreages of alpine meadow also ocur within the alpine region.

Appendix S-1 groups, by range site, the soil series mapped on rangeland in the Gunnison Basin and indicates pertinent physical properties of each. More detailed soil survey data are contained in the Soil Survey of Gunnison Area, Colorado (SCS 1975) which is available at the Montrose BLM District Office. The soil maps available for American Flats/Silverton, though too general to develop interpretive data, are the best data available. These maps are on file at the Montrose BLM District Office.

EROSION

The Gunnison Basin can be divided into the acreage classified as existing range sites and the remaining unclassified acreage, which includes timbered land, rock outcrop, rockslides, and stony rockland. Over 80 percent of the range sites are represented by sampling data from the 1978 range and wildlife inventory. Nearly 70 percent of the sampled range sites are in the moderate or the critical-severe erosion condition class and 30 percent are in the slight-stable condition class (BLM 1979a).

The present erosion condition on all range sites results from both natural or geologic erosion and accelerated erosion. On the lower elevation range sites (dry mountain loam, mountain loam, mountain outwash, and pine-grassland), natural erosion rate is approximately 0.4 and 0.8 ton/acre/year. On the high elevation sites (shallow subalpine and subalpine loam), natural erosion rates are approximately 0.05 to 0.2 ton/acre/year (BLM 1979a). Natural erosion on the mountain swale and mountain meadow range sites is very low (0.01 to 0.02 ton/acre/year) since these are normally depositional areas. No estimate is available for alpine slopes or deep clay loam range sites. The approximate present average erosion rate for all range sites is 3.1 tons/acre/year.

Soil loss from sheet and rill erosion in the Gunnison Basin portion of the EIS area was estimated for each alternative action by range site using the "Hydro" computer simulation model and based on the Universal Soil Loss Equation. The methodology is explained in Appendix W-1. This method is one of the best available for estimating water erosion and is widely used by the SCS and other institutions. It does not account for gully erosion and does not calculate sediment yield. Attempts have been made to modify this equation for rangeland use; however, its limitations for use on extensive areas with steep, variable slopes and high snowmelt preclude estimating precise soil loss values. Appendix S-2 outlines the approximate soil loss for each alternative action by range site on rangeland portions of the Gunnison Basin. Values were not given for the alpine slopes due to lack of data, or the deep clay loam range sites which only occur on a very small acreage.

The present plant and litter cover is the single site factor most closely correlated with soil erosion (Meeuwig 1970). All range sites for which data are available show a considerable deficiency in plant cover (BLM 1979a). The resultant proliferation of sagebrush, which inhibits the growth of understory plants (Frischknecht 1978), on most range sites further aggravates the erosion situation.

The American Flats/Silverton soils, especially in the alpine portions, are subject to a variety of erosional processes. Man-made disturbances can greatly magnify the influence of these erosion factors. Sheep trailing has caused a striated pattern of scars over most of the steep slopes and some relatively flat areas (BLM 1979b). Trampling on wet soil below late-lying snowbanks causes soil compaction and increases erosion. Ruts created by ORV travel and poorly designed "cat" roads often initiate gully erosion. Another source of water erosion is old mine tailings. Where these materials form portions of roadbeds they are particularly vulnerable to sliding (BLM 1979b).

Data from the 1978 range and wildlife inventory indicate moderate sheet and rill erosion with some gullying in the subalpine loam range sites in the northeast corner of American Flats/Silverton. Most of the sample sites in the alpine areas show moderate erosion with some critical problem areas.

Wind erodibility groups are an indication of soil blowing hazard, and are included in Appendix S-1 for the Gunnison Basin. No quantified data are available on actual wind erosion losses in the EIS area. However, some assumptions can be made. Wind erosion in the Gunnison Basin is of a low magnitude due to moist soil conditions or snow cover much of the year and tall, multi-layered, relatively dense vegetative cover. In American Flats/Silverton, conditions are much more conducive to wind erosion. Average windspeeds of 25 to 30 miles per hour in the winter and 5 to 20 miles per hour in the summer are common in the alpine zone (Thilenius 1975). The low stature and sparse cover of vegetation on many sites allow more wind erosion than in taller vegetation. Breaks in the vegetative mat often result in the fine soil particles being removed by the wind, leaving only coarser sands, gravel, and rock. The eroding belts may widen downslope by undercutting the turf (Thilenius 1975). These areas are very slow to heal. Natural wind erosion is greatest on ridgetops and on high, exposed locations. Sheep trailing, ORV traffic, and minerals prospecting are major human activities contributing to this problem. Old mine workings and tailing deposits are another prime source of wind erosion.

COMPACTION

Heavy grazing by livestock results in soil compaction (Lull 1959; Reynolds and Packer 1962; Rauzi and Smith 1973). This causes reduction of the soils macro-pore space and results in reduced infiltration, percolation, and water holding capacity of the soil, and increased runoff (Lull 1959). Trampling effects are most severe on moderately wet soils and those with a high clay content (Reynolds and Packer 1962). Compaction is especially high along drainages, other watering facilities, and livestock trails where heavy livestock traffic occurs.

No quantified data are available directly measuring soil compaction. However, changes in the macro-pore space of the surface inch of soil are the major effect of compaction and these changes are highly correlated with changes in the infiltration rate (Lull 1959). Thus, for purposes of analysis, changes in compaction are assumed to be approximately inversely proportional to changes in infiltration rate for each range site. Actual changes in bulk density of the soil would be of a smaller magnitude. The percent change in compaction for each alternative, compared to the present is indicated in Appendix S-2.

Water Resources

HYDROLOGIC SETTING

The majority of the EIS area lies within the Upper Gunnison (approximately 587,970 acres of public lands), with smaller portions located in the Animas (approximately 43,055 acres of public lands) and Uncompahgre River basins (approximately 3,760 acres of public lands).

The elevation, on public lands within the EIS area, varies from 14,058 feet (Handies Peak) to 6,754 feet (confluence of Cimarron Creek and the Gunnison River) above sea level. "The topography is extremely variable with moderately to steeply sloping mesas highly dissected by steep-sided drainageways or canyons at the lower elevations versus very high glaciated peaks whose slopes descend into gently to strongly sloping highmountain basins and into long steep-sided ridges at the upper elevations." (Colorado Water Conservation Board and the USDA, 1962).

WATER QUALITY

Water quality varies considerably over the EIS area and there is a complete lack of data to quantify any effects from grazing. However, the non-point pollutants of concern from grazing are: sediments, turbidity, fecal pathogens, and nutrients.

On-site soil erosion is discussed in the Soils section, while sediment is discussed in the Water Resources section. On-site soil erosion is considered to be actual soil particle detachment and/or movement at a given location which usually occurs during rainfall events; while sediment is eroded material carried to stream channels by surface runoff, usually occurring during spring snowmelt and the rare intense rainfall event. Sediment yield includes sediment from both surface and channel erosion.

The sediment that reaches the area's streams is largely a function of the soils ability to infiltrate and percolate water and its inherent resitance to erosion. According to a study done in western Colorado by Frank, Brown, and Thompson (1975) suspended-sediment concentration after summer storms can be as much as six times that sampled during snowmelt, but total suspended-sediment production during snowmelt was eight to nine times greater than that produced during summer storms because of the low storm runoff volume.

Sediment production is accelerated in areas where a lack of vegetation cover (areas heavily grazed, stock and wildlife trails, roads, burned areas, etc.) exposes the soil surface to the full force of raindrop impact resulting in detachment of soil particles erosion. Poor vegetation density allows surface runoff to carry some of these soil particles (sediment) to the nearest channel or gully. As flow is concentrated into these steep-walled gullies, the susceptibility of the gully to headward and channel erosion is increased. Often the vertical banks of the gully collapse adding sediment to the channel flow. The quantity of sediment that can be removed from a watershed by these processes can be very large. According to Osborn, Simanton, and

Renard, "Sediment yields are as much as three times greater for gullied as ungullied watersheds."

In addition, suspended sediment adds turbidity to the water which reduces the depth to which sunlight can be transmitted, affecting the aquatic habitat.

Existing stock pond/reservoirs in the EIS area have an effect on basin sediment yield in that they retain sediment until the reservoir is filled or the dam is breached.

Fecal coliform bacteria (used to indicate the possible presence of pathogenic bacteria) are part of the water quality where livestock, recreationists, and wildlife have accesss to streams and reservoirs. According to Stephenson and Street (1978), "The occurrence of fecal coliforms was directly related to the presence of cattle on summer range and winter pastures. Fecal coliform counts in adjacent streams were found to increase soon after cattle were turned in and remained high for several months after cattle were removed."

Runoff from areas around stock ponds is liable to be bacterially contaminated; however, the chances for degradation of adjacent water are reduced with distance of overland flow and time for consequent aeration. Biologically, the addition of animal waste to streams and reservoirs promotes growth of aquatic and semi-aquatic plants by providing nutrients in soluble form to the water.

According to the Gunnison County Stream Water Quality Study (1978), the total coliform count out of two samples on Cebolla Creek and one on Cochetopa Creek is 386 colonies/100 ml. The fecal coliform to fecal streptococci ratio for these samples is approximately .41 which indicates the bacteria originated from an animal, and not a human source.

Giardia lamblia cysts, a waterborne protozoan found in certain warm-blooded animals, is a growing concern throughout the EIS area. The most common wild carriers of *Giardia* are beaver which are 18 percent positive while the most common domestic carriers are cattle which are up to 60 percent positive.

Since most cases of giardiasis (the disease caused by *Giardia lamblia*) are related to drinking untreated water, a threat to recreationists exists. For more information on giardiasis, see BLM Instruction Memorandum No. CO-79-08.

According to an EPA estimate the salinity concentration of the Gunnison River at the Blue Mesa Reservoir is 158 milligrams per liter (mg/l). For irrigation water, under 500 mg/l will usually result in no detrimental effects.

For additional information on the EIS area's water quality, see BLM 1979a and BLM 1979b.

WATER QUANTITY

Infiltration and Runoff

When any form of precipitation (rain, hail, snow, etc.) falls on the land surface, its potential paths are varied. They are determined by factors that include: the amount of plant-available water; the condition of the soil (frozen, warm, dry, saturated, dense, porous, etc.); growth stage of the vegetation; steepness, roughness, and orientation of land slopes; and the amount of organic litter on the land surface. Once these paths are determined, the precipitation is either transpired, evaporated, added to soil moisture, or becomes runoff which consists of surface runoff, interflow, and ground water runoff via ground water storage.

Surface runoff on rangelands occurs when a maximum amount of moisture has been absorbed by both vegetation (interception storage) and soils (soil moisture storage) and when the rate of precipitation exceeds the rate of moisture flow into the soil (infiltration rate) (Branson, Gifford, and Owen 1972). The volume of runoff depends upon the characteristics of each storm and watershed. In the EIS area, most surface runoff occurs in response to spring snowmelt and high intensity summer thunderstorms.

Animal grazing causes soil compaction by trampling, and a reduction in the vegetation canopy. The result is a decrease in the soil infiltration capacity. Gifford and Hawkins (1978) cite numerous examples in the Western United States where measured infiltration capacities were considerably lower on heavy vs. light and/or not grazed soils. Consequently, an increase in surface runoff occurs from both spring snowmelt and rainfall events causing increases in the amplitudes of flood peaks, erosion, and sediment production. In some cases, the energy created by increased peak runoffs causes the stream channel to trench down, creating a gully, or if bedrock is near the surface, the energy is dissipated by forcing the stream channel to spread out and braid (Behnke n.d.). When the base level of a stream channel lowers to form a gully, the surrounding water table drops proportionately. With a reduction in soil moisture, caused by the combined effect of the lowered ground water table and a decrease in the soil infiltration capacity, the land and its components revert to a more dry condition.

Surface runoff resulting from spring snowmelt is generally a greater contributor to the total annual volume of surface runoff than intense summer thunderstorms. Flow volumes during the snowmelt season are largely dependent upon daily fluctuations in weather, the depth of snow, and the watershed slope orientation (Sturges 1975).

The present average infiltration capacity for the area is 1.91 inches/hour and the present surface runoff is approximately 0.2510 acre-feet/sq mi/6 month grazing season.

Flood Hazard

During the spring, occasional flood and/or sediment damage occurs on the floodplains of the area's streams and to roads, fences, and related structures that are within close proximity to the seasonal higher flows. These higher flow rates are, for the most part, a result of increased runoff from spring snowmelt.

Occasionally, high intensity summer thunderstorms produce enough runoff to cause localized flash floods which have the potential to damage structures within or near the affected channel(s). The magnitude of the flooding depends on the amount of precipitation received and various watershed characteristics, including drainage area, vegetation cover, and soil types.

Ground Water

In some areas, the elevation of unconfined ground water is lowered by gully formation. This process is described under Runoff.

There are currently no water wells to which BLM has title on public lands within the EIS area.

For additional information on the EIS area's ground water, see BLM 1979a and BLM 1979b.

RIPARIAN HABITAT

On portions of the EIS area, vegetation has been removed along stream courses which has increased the amount of solar radiation reaching the water's surface. Besides causing an increase in the water's temperature, it lowers the dissolved oxygen content. The vegetation also serves as a natural filtration system for sediment and as an obstruction to highwater streamflow.

Due to human and animal trampling on portions of the EIS area, streambanks have collapsed and sloughed in some parts of the EIS area. This has resulted in increased channel erosion, channel deformation, and an increase in the water's turbidity. Because of a lack of data and literature on this subject, it is impossible to quantify the present hydrologic condition of the EIS area's riparian habitat.

OTHER WATER-RELATED TOPICS

For discussions and listings of water law, water control structures, perennial and intermittent streams, and lakes and ponds, see BLM 1979a and BLM 1979b.

Terrestrial Wildlife

The EIS area is an important environment for numerous terrestrial wildlife species. The most prominent of these are the five big game ungulates which are also the most competitive with domestic livestock for vegetation. The EIS area is presently inhabited by approximately 8,500 elk in winter and 2,700 in summer and one year-long herd of about 200 (see Map 5--Support Data); by about 15,800 mule deer in winter and 5,100 in summer (see Map 6--Support Data); by approximately 150 pronghorns year-long (see Map 6); by about 120 bighorn sheep in winter and 140 in summer, and 90 yearlong (see Map 5); and by approximately 25 mountain goats in winter (see Map 6). Elk inhabit about 561,000 acres of public land in the EIS area in winter; about 136,000 acres in summer; and about 42,000 acres yearlong. Mule deer occupy about 534,000 acres in winter and about 177,000 acres in summer. Pronghorns inhabit about 58,000 acres yearlong. Bighorn sheep occupy about 12,000 acres in winter; about 27,000 acres in summer; and about 12,000 acres yearlong. Mountain goats inhabit about 8,000 acres in winter. The crucial winter ranges for the elk and mule deer are especially important for the survival of the relatively large numbers of these two big game species.

The area is also essential habitat for many other species of wildlife. Detailed lists of mammals, birds, reptiles, and amphibians occurring in the EIS area are available in BLM 1979a and BLM 1979b. All of these animals are affected to some degree by changes in their habitats.

The amounts and kinds of essential elements for life (e.g., food, water, and cover) are dependent on the extent and quality of the different plant communities on the various range sites in the habitat types found in the EIS area. There are five basic habitat types: riparian, sagebrush, mountain shrub, woodland, and alpine. These types are the same as the vegetation types described in the Vegetation section, except that the woodland habitat type encompasses the ponderosa pine-Douglas fir, spruce-fir, aspen, and meadows vegetation types. The relationships of vegetation types to range sites are shown in Table 3-3.

Habitat condition can be equated to ecological site condition. Summaries of data on the ecological condition of the various range sites are given in Appendix V-2. Several sources of background information and data which are cited, analyzed, and available in BLM 1979a and BLM 1979b include: Colorado Division of Wildlife (DOW) extensive browse utilization and pellet group transects, DOW annual harvest data, DOW annual aerial population trend counts, DOW computer modelling of big game population data, BLM extensive browse utilization and pellet group transects, BLM rangeland condition and trend transects, BLM key browse species transects, BLM computer modelling of range survey data, BLM special habitat feature forms, and BLM animal species occurrence forms. Transects were run in nearly all of the allotments in the EIS area. The browse condition in the areas sampled was generally moderate to high in terms of percent satisfactory and the utilization was moderate on the average. However, on crucial mule deer and elk winter ranges, browse utilization was generally much higher; and hence, browse condition was lower.

The terrestrial wildlife species will be discussed in this section by their habitat types. Some of the animal species occurring in the EIS area and three federally listed endangered species which may be present are listed in Table 3-4 by habitat type.

RIPARIAN

Riparian areas are very unique, especially in the arid west, in providing habitat for a great number and variety of wildlife species. They are also used by many animals as travel corridors which facilitate dispersal. This type can be found within each of the other four habitat types and is very susceptible to overgrazing and bank destruction by livestock. "Vegetation in certain areas, such as meadows and drainage ways are invariably closely utilized under any stocking rate or system of grazing. Such use may be detrimental to wildlife, esthetic or recreational or other values." (Hormay 1976). These conclusions are confirmed by Ames (1977).

Riparian areas are very important in the life cycle of sage grouse. As broods hatch, these areas supply a critical need in the diet of young grouse which are unable, at this time, to eat seed material or tolerate the strong oils contained in sagebrush. The diet of broods consists mostly of insects and succulent green foliage. If this material is not available in sufficient quantity or quality, the survival rate for young sage grouse declines and the population declines.

The woody species in this habitat type are also important. Willows are a valuable source of food and cover for many species of wildlife. Cottonwood twigs as well as aspen twigs and bark are used as browse by wintering big game. Mature cottonwood and aspen trees provide habitat for wildlife species such as cavity-nesting and stick-nest building birds.

Table 3-5 (Aquatic Wildlife) shows that about 51 percent of surveyed riparian habitat is in need of improvement based on range condition and trend and browse utilization transect data.

SAGEBRUSH

This type is used by almost as many species as the riparian type because it usually borders that type and it also makes up the greatest portion of the EIS area. The sagebrush type often contains pockets of other vegetation types or can occur by itself as a park in the woodland type. Certain portions of this type are very important to wintering elk, mule deer, and pronghorns in providing emergency winter food when their preferred forage species are unavailable due to either deep snow or livestock use. Presently there is a large percentage of area in the sagebrush type in poor and fair rangeland condition.

North of Highway 50, the browse is being overutilized in the sagebrush type and, to some extent, in the riparian type by a combination of livestock and winter concentrations of big game. The western most portion of the Sapinero Wildlife Management Area (see Map 1) containing Red Creek, Dry Gulch, and East Elk Creek is not grazed by livestock, is used heavily by mule deer and elk in winter, and is one of the few areas in good condition with an upward trend.

MOUNTAIN SHRUB

This type is characterized by various species of shrubs such as mountain mahogany, serviceberry, snowberry, oakbrush, bitterbrush, and rabbitbrush. These species are important as shelter and food

TABLE 3-4

TERRESTRIAL ANIMAL SPECIES BY HABITAT TYPE

	Riparian	Sagebrush	Mountain Shrub	Woodland	Alpine
Mammals					
Elk	X	X	X	X	X
Mule Deer	X	X	X	X	
Pronghorn		X			
Bighorn Sheep		X	X		X
Mountain Goat					X
Black Bear	X			X	
Mountain Lion	X	X	X	X	
Coyote	X	X	X	X	
Bobcat	X	X	X	X	
Beaver	X				
Muskrat	X				
Porcupine	X	X	X	X	
Marmot	X	X	X	X	X
Rabbits	X	X	X	X	
Hares	X	X	X	X	
Prairie Dog		X			
Ground Squirrels	X	X	X	X	
Birds					
Sage Grouse	X	X			
Blue Grouse	X			X	
Sharptail Grouse	X	X	X	X	
Ptarmigan	X				X
Mourning Dove	X	X			
Waterfowl	X				
Shorebirds	X				
Raptors	X	X	X	X	
Passerines	X	X	X	X	X
Reptiles					
Wandering Garter Snake	X		X	X	
W. Smooth Green Snake	X				
Great Basin Gopher Snake	X	X	X	X	
Amphibians					
Utah Tiger Salamander	X				
Threatened and Endangered Species					
Black-Footed Ferret		X			
Bald Eagle	X	X	X		
Peregrine Falcon	X	X	X		

for several species. Their availability can be critical to the winter survival of elk, mule deer, and some rodents. The mountain shrub type usually occurs as either a transitional zone between sagebrush and woodland or as small pockets in the sagebrush type.

WOODLAND

This habitat type is dominated by conifers and aspen, usually with the aspen occurring just below the conifers in elevation. It is used by forest-dwelling animal species such as black bears, porcupines, blue grouse, owls, summering mule deer and elk, and several others. Sometimes open areas of other types such as meadows, rock fields, talus slopes, cliffs, and others occur within the woodland type. These areas, especially the meadows, are also used by several species.

ALPINE

This type occurs above timberline and is dominated by alpine willow and low-growing herbaceous plants. Several animals are commonly found in this type including summering bighorn sheep, mountain goats, marmots, and pikas in the rockier areas; ptarmigan in the willows; and occasionally summering elk. This type is very fragile and very slow to heal after abuse such as excessive trailing and over-utilization of the vegetation. The availability of willow buds in snow in the alpine type and also in the riparian type just below timberline is crucial to the winter survival of ptarmigan.

THREATENED AND ENDANGERED SPECIES

The U.S. Fish and Wildlife Service, through Endangered Species Act Section 7 Formal Consultation Procedures, has determined that three endangered species on the federal list may be present in the EIS area. These include the black-footed ferret, the peregrine falcon, and the bald eagle, all of which also appear on the Colorado state list.

The black-footed ferret is the only rare mammal expected to occur in the EIS area. Its habitat type is almost exclusively prairie dog habitat, generally occurring as areas of bare ground and very low growing forbs. Several unconfirmed sightings of ferrets have been made in recent years at one of the larger prairie dog towns on National Park Service administered land in the EIS area.

The peregrine falcon has occurred in the EIS area, but there are no known active nests in the area today, although positive sightings of peregrines have been made in recent years. The Cimarron and Little Cimarron canyons on the northwestern edge of the EIS area meet the criteria for essential peregrine falcon habitat (DOW 1978); however, most of this habitat is on private land.

About ten to fifteen bald eagles annually winter near Blue Mesa Reservoir in the EIS area, but none remain in the area to nest. These eagles feed on fish and probably waterfowl from open water on the reservoir and up the major drainages from the reservoir. They also feed on dead fish left by ice-fishermen and on dead deer found near the reservoir. They seem to prefer cottonwood trees located near feeding areas for perch sites.

The EIS area is also historical habitat for several other threatened and endangered species. The river otter, which appears as endangered on the state list, has been transplanted by the Division of Wildlife to habitat just northwest of the EIS area, but the status of the animals released is not certain and none have been observed in the EIS area. The wolverine (endangered on the state list), the gray wolf (endangered on the federal and state lists), the grizzly bear threatened on the federal list and endangered on the state list), and the lynx (endangered on the state list) are past residents of the EIS area. None of these animals are known to occur in the area at the present. The greater sandhill crane (endangered on the state list) and the whooping crane (endangered on the federal list) migrate through the EIS area but have not been observed to stop.

Also occurring in the EIS areas at Los Pinos Pass (see Map 5) is a population of a very uncommon katydid, *Cyphoderris strepitans* (Morris and Gwynne 1978). The total Los Pinos population occupies an area of only about 5 acres. "...the relict southern populations remain quite local and are possibly sensitive to habitat degradation. Such a situation in Colorado probably consitutes good cause for considering the species as 'sensitive' at least, if not threatened." (Willey, personal communication).

Aquatic Wildlife

The Gunnison Basin Resource Area (GBRA) contains approximately 650 miles of combined intermittent and perennial stream habitat (Map 7--Support Data). The Gunnison River, one of the major rivers draining the resource area, is a tributary to the Colorado River Basin and originates 10 miles north of Gunnison near Almont at the confluence of the Taylor and East rivers. Tomichi Creek, with its major tributaries of Quartz and Cochetopa creeks, joins the Gunnison River at Gunnison. Two major sub-basins, Cebolla Creek and Lake Fork of the Gunnison River, flow into the Gunnison from the south. Cebolla Creek enters Blue Mesa Reservoir at Iola Basin and Lake Fork of the Gunnison enters just above Blue Mesa Dam. There are four major drainages in the American Flats/Silverton planning area. Flowing to the northeast and into the Gunnison River drainage basin are Henson Creek and the uppermost portion of the Lake Fork of the Gunnison. These two systems merge at Lake City to become the main stem of the Lake Fork. Of the other two major tributaries, one flows north to form the Uncompahgre River drainage and the other flows south to form the Animas River drainage system.

Of the estimated 650 total miles of stream in the GBRA, 310 miles flow through lands upon which livestock grazing programs are administered by the BLM. Appendix F-1 lists the major intermittent and perennial drainages that fall within the boundaries of the Gunnison EIS area. The BLM administers 47 percent of the stream miles within the EIS area, the habitat condition of which ranges from nondescript (no data) to excellent. The asterisked streams in the table in Appendix F-1 are known to be fishery habitat based on intensive inventory methods conducted in preparation of the URA and the MFP for the GBRA. Only those streams containing asterisks, and listed in Table 3-5 will be given consideration in determining the impacts during the preparation of the EIS, while every effort is currently being made to fill in the data void that exists on the balance of the streams mentioned in Appendix F-1.

There are 42 streams totaling 395 miles of perennial aquatic habitat within the GBRA. Approximately 189 miles of streams pass through BLM administered lands and 113 of these miles (60 percent) are known to support populations of fish. The other 40 percent are possible fish habitat although none were observed during the intensive inventory process. The average stream elevation for the Gunnison planning area is 8,725 feet and for the American Flats/Silverton planning area is 10,347 feet. The average stream elevation for the GBRA is 9,050 feet. The stream gradients range from less than 1 percent on several streams (0.5 percent) to 30 percent on El Paso Creek with an average gradient of about 2 percent throughout the resource area.

The fishery resource in the GBRA consists primarily of numerous small streams with flows from 1 to 10 cubic feet per second (cfs). Brook trout and brown trout are the most abundant. Natural reproduction sustains the majority of the fisheries in the streams; however, rainbow trout populations are supplemented through stocking programs carried out by the Division of Wildlife (DOW). Historically, the Colorado cutthroat trout (*Salmo clarki pleuriticus*) was commonly found in the Gunnison Basin drainages, but introduction in the late 1800s of brook, brown, rainbow, and various subspecies of the cutthroat trout have replaced the original "native" cutthroat. The cutthroat subspecies currently most commonly stocked by the DOW is the Yellowstone cutthroat trout (*Salmo clarki lewisi*), now referred to as "native trout", found in several locations in the resource area. All these species comprise the game fish resource of the GBRA. The non-game species such as dace and suckers are a rarity with the exception of the larger tributaries to Blue Mesa Reservoir where migrating suckers are numerous.

AQUATIC AND RIPARIAN HABITAT

The association between the aquatic and riparian habitats is a unique, highly complex relationship in which the alteration of either can effect them both (Maser 1979, personal communication). The interrelationships between the aquatic and riparian habitat have been well documented and a discussion of the association can be referred to in Appendix F-2.

Riparian zones (Figure 1, Appendix F-3) can be identified by the presence of vegetation that requires free or unbound water or conditions that use more moisture than normal (Thomas et al. 1978). They are streams, lakes and wet areas, and adjacent vegetation communities which are predominantly influenced by their association with water (Riparian Habitat Subcommittee of the Oregon/Washington Interagency Wildlife Committee 1979) and are characterized by species and/or life forms that are different from those of the immediately surrounding non-riparian climax (Lowe 1964, as cited by Brown et al. 1977). The riparian vegetation type is normally found at the interface between the aquatic and terrestrial environments and is not only influenced by its association with water but has a direct influence on the aquatic ecosystem. The riparian system contains elements of both aquatic and terrestrial ecosystems plus retaining unique characteristics found in none of the other habitat types.

The three major functions of riparian vegetation of providing shade to control stream temperatures, maintaining streambank stability thus reducing erosion, and providing a "filter" against sediment flow are well documented. Figures 2, 3, and 4 in Appen-

TABLE 3-5

ESTIMATED MILES, CONDITION, AND PRODUCTIVITY OF STREAM HABITAT IN THE EIS AREA

Stream Name, I.D. Number, and Sample Station	Total Miles (approx.)	BLM Miles (approx.)	Percent BLM	Aquatic Habitat Condition 1/	Riparian Habitat Condition 2/	Fish Production lbs/acre	Species Present 3/
Alder Creek AC-1	4.00	2.75	68.7	Good	2	152.0	Bk,Bn
Alder Creek AC-2	4.00	2.75	-	Good	2	18.0	Bk,Bn
ntelope Creek AnC-1	8.60	2.50	29.1	Poor	2		None
West Antelope Creek WA-1	5.40	3.75	69.4	Fair	1	10.0	Native
West Antelope Creek WA-2	5.40	3.75	-	Fair	2		None
South Beaver Creek SB-1	16.00	8.75	54.7	Good	4	1.9	S
South Beaver Creek SB-2	16.00	8.75	-	Good	4	17.2	S
Cabin Creek CaC-1	6.00	5.00	83.3	Fair	2		None
Beaver Creek BC-1	5.40	1.00	18.5	Fair	1	23.5	Rb,Bk
Cebolla Creek CeC-1	28.80	6.25	21.7	Good	3	66.2	S,D,Rb,Bn
Cebolla Creek CeC-2	28.80	6.25	-	Good	4	25.0	Bn,Rb,S
Cebolla Creek CeC-3	28.80	6.25	-	Good	4	43.3	Bn
Cebolla Creek CeC-4	28.80	6.25	-	Good	4	23.6	Bn,Rb,S
Cochetopa Creek CC-1	29.20	7.25	24.8	Excellent	4	12.0	Bn,S
Cochetopa Creek CC-2	29.20	7.25	-	Excellent	4	12.0	Rb,Bk,Bn
East Elk Creek EE-1	4.20	1.75	49.0	ND	3	40.2	Bk,Rb
Fourth of July Creek FOJ-1	4.60	3.25	70.6	Fair	1	187.0	Bk
Gold Basin Creek GB-1	10.00	6.50	65.0	Poor	4		None
Goose Creek GC-1	6.40	2.75	43.0	ND	2		None
Hot Springs Creek HS-1	4.40	1.10	25.0	Excellent	4	229.0	Bk,Bn,Rb,S
ndian Creek IC-1	10.60	7.75	73.1	Fair	1		None
Larson Creek LaC-1	1.40	0.75	53.6	Excellent	4		Bk
Little Cimmaron LC-1	12.21	1.25	10.2	Fair	1	15.0	Bk
os Pinos LP-1	7.28	1.10	15.1	Excellent	4	19.0	Bk,Rb,D,S
Pauline Creek PaC-1	2.60	1.50	57.7	Excellent	1	28.5	Bn,Bk,Rb,S
Pole Creek PC-1	8.00	8.00	100.0	Good	2		None
East Fork Powderhorn EFPC-1	13.50	13.50	100.0	Good	1	55.9	Bk,Bn
East Fork Powderhorn EFPC-2	13.50	13.50	-	Good	1	152.5	Bk,Bn
East Fork Powderhorn EFPC-3	13.50	13.50	-	Good	4 4/	356.3	Bk
East Fork Powderhorn EFPC-4	13.50	13.50	-	Good	1	206.3	Bk,Bn
Middle Fork Powderhorn MFP-1	13.20	10.25	75.9	Fair	3 4/	39.7	Bk,Bn
Middle Fork Powderhorn MFP-2	13.20	10.25	-	Fair	2		None

1/ Aquatic habitat condition: Excellent = 16%, Good = 35.0%, Fair = 38.0%, Poor = 9%, ND = No Data = 2%.

2/ Riparian habitat condition: Values of 1-3 indicate that opportunities for improvement exist. A value of 4 indicates that the riparian zone, based on data available, appears to be in good condition. Detailed explanation of values 1-4 may be found in the terrestrial wildlife portion of URA 1979a. Based on these values: 23.19% = 1; 18.5% = 2; 9% = 3; 38.5% = 4; 10.8% = ND.

3/ Species present: Bk = Brook Trout, Bn = Brown Trout, Rb = Rainbow Trout, Nt = Native Cutthroat, D = Dace, S = Sucker.

4/ Portions of stream influenced by Powderhorn Primitive Area.

TABLE 3- 5

ESTIMATED MILES, CONDITION, AND PRODUCTIVITY OF STREAM HABITAT IN THE EIS AREA (continued)

Stream Name, I.D. Number, and Sample Station	Total Miles (approx.)	BLM Miles (approx.)	Percent BLM	Aquatic Habitat Condition 1/	Riparian Habitat Condition 2/	Fish Production lbs/acre	Species Present 3/
West Fork Powderhorn WFPC-1	9.00	8.00	88.9	Excellent	1	18.4	Bk,Bn,Rb,Nt
West Fork Powderhorn WFPC-2	9.00	8.00	-	Excellent	4 4/	17.7	Bk
Powderhorn Swamp PSW-1	N/A	N/A	N/A	N/A	N/A		None
Razor Creek RZ-1	9.00	0.50	5.5	Poor	1	4.6	Rb,S,D
Red Creek RC-1	4.80	2.00	41.7	Good	3	206.7	Bk
Rock Creek Rock-1	11.00	4.75	43.2	Fair	4	234.6	Bk,Bn,Rb
Rock Creek Rock-2	11.00	4.75	-	Fair	ND	237.9	Bk
Rock Creek RC-1	2.20	2.00	90.9	Excellent	4		None
Spring Creek Spr-1	1.00	0.31	31.0	Fair	1	71.8	Bk,Bn,Rb
Stevens Creek SC-1	4.00	2.31	57.8	Good	2		None
Stubbs Gulch SG-1	Int	1.10	N/A	Good	4		None
Sugar Creek S-1	8.40	8.00	95.2	Poor	2		None
Trout Creek TC-1	7.20	5.00	69.4	Fair	4		None
Trout Creek TC-2	7.20	5.00	-	Fair	2		None
Willow Creek W-1	15.40	4.25	27.6	Fair	4	80.5	Bk,Bn,Nt
Willow Creek W-2	15.40	4.25	-	Fair	4	ND	Nt
South Willow Creek WC-1	15.00	6.00	40.0	Fair	1	46.2	S
South Willow Creek WC-2	15.00	6.00	-	Fair	1		None
North Willow Creek NWC-1	4.60	3.00	65.2	Fair	2	16.0	Bk
Van Boxel Creek VB-1	6.00	3.75	62.5	Excellent	4	78.0	Rb,Nt
Bear Creek BC-1	0.75	0.75	100.0	Good	ND		None
Cinnamon Creek CinC-1	2.00	2.00	100.0	Excellent	ND	?	?
Cottonwood Creek CWC-1	4.00	3.63	90.7	Good	3	17.0	Bk
El Paso Creek EPC-1	1.20	1.00	83.3	Excellent	ND		None
Henson Creek Hen-1	17.00	13.50	79.4	Good	4	24.4	Bk,Rb
Henson Creek Hen-2	17.00	13.50	-	Good	4	16.8	Bk
North Fork Henson Creek NHC-1	3.00	2.50	83.3	Good	3	11.7	Bk
North Fork Henson Creek NHC-2	3.00	2.50	-	Good	4		None
Lake Fork Gunnison LFG-1	50.00	15.75	31.5	Fair	4	89.7	Bk
Lake Fork Gunnison LFG-2	50.00	15.75	-	Fair	1	80.9	Bk,Rb
Lake Fork Gunnison LFG-3	50.00	15.75	-	Fair	4	70.6	Bk
Mineral Creek Min-1	1.50	0.50	33.4	Good	ND		None
West Fork Animas River WFAR-1	16.40	2.00	12.2	Excellent	ND		None
TOTALS	395	189.3	48.0				

dix F-3 indicate the effects on trout production of increased temperatures, erosion, and sedimentation (R.H.S. 1979). There are, however, a number of other factors which should be included when considering the complexity of the association between the aquatic and riparian habitat and the role that streamside vegetation plays in preserving the quality of the aquatic ecosystem. These additional factors of providing food and habitat, maintaining species diversity and a discussion concerning the importance of intermittent as well as perennial streams can be referred to in Appendix F-4.

In the GBRA, the riparian zone is associated not only with the 395 miles of perennial streams within the basin, but also with the many miles of intermittent streams, springs, and meadows. Based on the rangeland and browse utilization data, summary ratings for the riparian zones in the GBRA were recorded (Table 3-5 and Table 3-6). These values were included to give the reader a general idea as to the current condition of the riparian system at the time the stream and riparian inventories were conducted.

There were 65 sampling stations set up on selected streams within the resource area (Table 3-5). Data collected at these stations indicate that the riparian zones sampled at 33 (50.6 percent) stations were in need of improvement and 25 (38.5 percent) of the stations yielded data that indicate the riparian zones were in satisfactory condition. Inventory data collected on aquatic habitat condition indicate that 16 percent (30.2 miles) of the stream miles are presently in excellent condition, 35 percent (66.2 miles) good condition, 38 percent (71.8 miles) are in fair condition, and 9 percent (17.0 miles) are in poor condition.

Fish production and the quality of riparian and stream habitat (as reflected by range trend and stream profile ratings in Table 3-6) appear to have a direct relationship as shown by Gregg (1978), and BLM 1979a-Fisheries. An explanation of range trend and stream profile ratings may be found in USDA 1976 and BLM 1979a-Fisheries, respectively. The plants commonly associated with the riparian zones in the GBRA are described in the vegetation portion of this statement.

LAKES AND RESERVOIRS

Blue Mesa Reservoir (9,050 surface acres), Upper and Lower Powderhorn Lakes (33 surface acres), Devils Lake (43 surface acres), and Lake San Cristobal (350 surface acres) comprise the major portion of the lake fishery in the GBRA. The stocking tables along with detailed physical descriptions of the various lakes and reservoirs in the resource area may be found in BLM 1979a and b. Some excellent fisheries exist in Lake San Cristobal for lake trout and other species, and in Blue Mesa Reservoir for all trout species and large numbers of kokanee salmon. Kokanee runs in the fall from Blue Mesa and Morrow Point reservoirs are important fisheries in the GBRA, but are not on BLM administered lands. In the section of Lake Fork Gunnison, above Lake San Cristobal, are some excellent spawning grounds situated on BLM administered lands.

THREATENED AND ENDANGERED SPECIES

The data available to date do not indicate that there are any threatened or endangered fish species occurring within the EIS area (BLM 1979a and b--Fisheries).

Livestock Grazing

At present there are 121 livestock operators depending on public land to graze 37,491 cattle; 45,240 sheep; and 801 horses on 167 allotments, 13 of which are unallotted. There are 28 sheep only operations, 2 sheep/cow-calf, 5 yearling only, 4 horse only, and 115 cow/calf operations. Numerous operators maintain a few horses which are used in conjunction with the livestock operation.

The Gunnison planning area contains 118 cattle allotments, 9 sheep allotments, 4 horse allotments, 10 unallotted, and 2 combination sheep-cow/calf allotments. Nineteen sheep allotments, 2 cattle allotments, and 3 unallotted allotments are located in the American Flats/Silverton planning area.

The general livestock operation in the area is season-long on intermingled public and private land with turnout dates, depending on weather, from May 1 in Gunnison and Saguache counties through July 20 in the higher elevation sheep allotments of Hinsdale, Ouray, and San Juan counties. The majority of use is growing season long; however, some allotments are grazed by cattle in the spring enroute to national forest systems lands and grazed in the fall on the way home.

Hereford is the most common breed of cattle in the EIS area. Other breeds include Charolais, Angus, and Simmental. Cross breeding is not as popular in the Gunnison area as in other areas within the state. Most bulls are of high quality registered stock.

TABLE 3-6

STREAM HABITAT DESCRIPTION IN RELATION TO ALLOTMENT NUMBER IN THE EIS AREA

Stream Name and I.D. Number	Allotment Number	Index 1/			Percent Browse Utilization	Species Present 4/	Stream Flow (cfs)
		RT 2/	SP 3/	Total			
Alder Creek - AC-1	6302	13	15	28	40.0	Bk, Bn	12.0
Alder Creek - AC-2	6302	13	12	25	58.0	Bk, Bn	12.8
Antelope Creek - AnC-1	5209 6208 6210 6216	8	7	15	49.0	None	0.5
West Antelope Creek - WA-1	6215 6208 6207 6203	16	14	30	8.0	Nt	7.1
West Antelope Creek - WA-2	6206	10	6	16	62.0	None	5.8
South Beaver Creek - SB-1	6107	19	16	35	7.0	S	27.0
South Beaver Creek - SB-2	6311	20	13	33	28.0	S	20.6
Cabin Creek - Cac-1	6301	15	11	24	52.0	None	ND
Beaver Creek - BC-1	6203	12	12	24	75.0	Rb, Bk	8.4
Cebolla Creek - CeC-1	6101 6107	15	15	30	22.0	S, D, Rb, Bn	57.6
Cebolla Creek - CeC-2	6001 6100 6104	15	14	29	17.0	Bn, Rb, S	55.2
Cebolla Creek - CeC-3	6108 6180 6111	18	17	35	0.0	Bn	31.5
Cebolla Creek - CeC-4	6112 6114	19	16	35	13.0	Bn, Rb, S	39.0
Cochetopa Creek - CC-1	6312 6317 6318 6316 6338	18	17	35	3.0	Bn, S	0.7
Cochetopa Creek - CC-2	6328 6329 6372 6362 6352	20	16	36	4.0	Rb, Bk, Bn	35.1
East Elk Creek - EE-1	6250	17	ND	17	70.0	Bk, Rb	17.6
Fourth of July Creek - FOJ-1	6123 6115	9	11	20	48.0	Bk	0.5
Gold Basin Creek - GB-1	6312 6311	19	4	23	1.0	None	0.0
Goose Creek - GC-1	6001 6100 6103	6	ND	6	17.0	None	0.0

TABLE 3-6

STREAM HABITAT DESCRIPTION IN RELATION TO ALLOTMENT NUMBER IN THE EIS AREA (continued)

Stream Name and I.D. Number	Allotment Number	Index 1/ RT 2/	SP 3/	Total	Percent Browse Utilization	Species Present 4/	Stream Flow (cfs)
Hot Springs Creek - HS-1	6366 6306	19	18	37	0.0	Bk, Bn, Rb, S	3.7
Indian Creek - IC-1	6103 6117	16	11	27	41.0	None	0.4
Larson Creek - LaC-1	6133	17	20	37	4.0	Bk	4.2
Little Cimarron - LC-1	6056 6051 6024 6005 6054	13	11	24	6.0	Bk	16.6
Los Pinos Creek - LP-1	6329	17	16	33	0.2	Bk, Rb, D, S	2.2
Pauline Creek - PaC-1	6362	14	16	30	12.8	Bn, Bk, Rb, S	25.7
Pole Creek - PC-1	6107	15	15	30	34.0	None	0.2
East Fork Powderhorn - EFPC-1	6104	14	15	29	19.0	Bk, Bn	13.1
East Fork Powderhorn - EFPC-2	6104	20	19	39	43.0	Bk, Bn	7.6
East Fork Powderhorn - EFPC-3	6104	10	14	24	20.0	Bk	1.6
East Fork Powderhorn - EFPC-4	6104	9	13	22	46.0	Bk, Bn	5.3
M. Fork Powderhorn - MFP-1	6104	16	13	29	42.0	Bk, Bn	3.7
M. Fork Powderhorn - MFP-2	6104	15	14	29	44.0	None	0.7
West Fork Powderhorn - WFPC-1	6104 6103	14	16	30	38.0	Bk, Bn, Rb, Nt	7.0
West Fork Powderhorn - WFPC-2	6102 6115	20	18	38	10.0	Bk	0.7
Powderhorn Swamp - PSW-1	6104	NA	NA	NA	6.0	None	NA
Razor Creek - RZ-1	6317 6318 6359 6326 6327 6334	1	5	6	61.0	Rb, S, D	7.9
Red Creek - RC-1	6250	19	14	33	73.0	Bk	1.8
Rock Creek - ROCK-1	6180 6109	17	16	33	17.0	Bk, Bn, Rb	0.7
Rock Creek - ROCK-2	6107	6	8	14	22.0	Bk	0.6
Rock Creek - ROC-1	6328	20	19	39	16.0	None	0.1
Spring Creek - Spr-1	6111	6	11	17	58.0	Bk, Bn, Rb	6.0
Stevens Creek - SC-1	6251 6202	14	15	29	70.0	None	3.0
Stubbs Gulch - SG-1	6312	13	7	20	0.4	None	NA
Sugar Creek - S-1	6107	10	6	16	32.0	None	0.1
Trout Creek - TC-1	6105	17	16	33	35.0	None	1.2

TABLE 3-6

STREAM HABITAT DESCRIPTION IN RELATION TO ALLOTMENT NUMBER IN THE EIS AREA (continued)

Stream Name and I.D. Number	Allotment Number	Index 1/ RT 2/	Index 1/ SP 3/	Index 1/ Total	Percent Browse Utilization	Species Present 4/	Stream Flow (cfs)
Trout Creek - TC-2	6105	3	6	9	79.0	None	0.9
Willow Creek - W-1	6055 6011	16	11	27	13.0	Bk, Bn, Nt	1.4
Willow Creek - W-2	6033	15	12	27	5.0	Nt	0.4
South Willow Creek - WC-1	6107	15	13	28	31.0	S	2.1
South Willow Creek - WC-2	6107	8	8	16	22.8	None	1.6
North Willow Creek - NWC-1	6202 6201	9	12	21	7.5	Bk	16.1
Van Boxel Creek - VB-1	6018 6024	18	17	35	0.0	Rb, Nt	1.2
Bear Creek - BC-1	6501	ND	14	14	57.0	None	0.5
Cinnamon Creek - CinC-1	6505 8903	ND	16	16	0.0		0.6
Cottonwood Creek - CWC-1	6527 6505 8903 6503	11	14	25	66.0	Bk	5.7
El Paso Creek - EPC-1	6528 6504	ND	18	18	0.0	None	4.0
Henson Creek - Hen-1	6526 6504	17	16	33	5.0	Bk, Rb	51.8
Henson Creek - Hen-2	6501	18	13	31	9.2	Bk	5.7
North Fork Henson Creek - NHC-1	6509	18	13	31	11.0	Bk	18.0
North Fork Henson Creek - NHC-2	6504	16	17	33	0.0	None	2.9
Lake Fork Gunnison - LFG-1	6526	12	12	24	4.0	Bk	5.3
Lake Fork Gunnison - LFG-2	6525 6503	15	14	29	50.0	Bk, Rb	24.8
Lake Fork Gunnison - LFG-3	6505	17	16	33	16.0	Bk	22.1
Mineral Creek - Min-1	6510 6505	ND	14	14	2.0	None	0.1
West Fork Animas River - WFAR-1	8902	ND	16	16	0.0	None	1.7

1/ Range Trend = RT; Stream Profile = SP, Index.

2/ Range Trend: 0-8 = declining; 9-11 = static; 12-20 = improving.

3/ Stream Profile: greater than or equal to 16--excellent; 14-15--good; 10-13--fair; less than 10--poor.

4/ Species Present: Bk = brook trout; Bn = brown trout; Rb = rainbow trout; Nt = native trout (cutthroat); S = sucker; D = dace.

Columbia, Suffolk, and Columbia-Rambouliet are the most common breeds and crossbreeds of sheep in the American Flats/Silverton planning area.

Approximately 85 percent of the cows are bred to calf between late March through middle May. In the northern end of the EIS area (Crested Butte) calving occurs as late as June 1.

Sheep permittees generally begin lambing April 1 and finish on May 15. Ninety percent of the lambing occurs from April 10 through May 1. Sheep are wintered in the open hay fields of the Uncompahgre Valley and lamb in protected sheds in the Montrose-Olathe area. When lambs are approximately 2 months old they are trucked to spring ranges in the Cimarron Valley, and held there until the high elevation summer range is open for grazing (July 4 to July 20). Sheep return from summer range from Labor Day through September 30. Lambs are either weaned on the allotment and shipped to slaughter or brought back to private pastures and sold in local markets later on in the fall.

Weaning weights of 5 month old lambs range from 92 to 112 pounds. Calf weaning weights vary from 360 to 440 pounds. Average yearling weight at time of shipment to feeders is 660 pounds.

Hay and pasture on private and leased lands are used for winter feeding in the Gunnison area. In the Montrose area, grain crops are grown and supplement the winter feeding program. The hay, pasture, and grain products not used in the ranch operation are sold as cash crops. Nearly all of the public lands in the EIS area are used for livestock grazing by permittees who operate from private lands within or adjacent to the unit. However, some sheep operators late winter their bands in Arizona, California, Utah, or the eastern slope of Colorado.

Cultural Resources

The Gunnison Basin area has been occupied for about 10,000 years. Both the history and prehistory have been the subject of study and analysis by the BLM. The prehistory of the area has been addressed by a Class I inventory (overview), "The Archeological Resources of the Uncompahgre and Gunnison Areas, West-Central Colorado," by Allan D. Reed and Douglas D. Scott. The history has also been addressed in a Class I inventory, "A Frontier In Transition; A History of Southwestern Colorado," by Paul M. O'Rourke. Both overviews are available at the Montrose District Office, BLM.

ARCHEOLOGICAL RESOURCES

The prehistoric occupation of the area is not well understood. The resource is best known through inventory, although the Colorado State Department of Highways and the National Park Service are currently excavating some sites in connection with project mitigation. There are little hard data on which to make definitive statements concerning the prehistory. It currently appears man has resided in the area for the last 10,000 years. During that time he followed a hunting-gathering way of life seasonal round, but he may not have resided in the basin on a year-round basis. He may have used the area more intensely during the warmer months of the year. There is some evidence to support a period of climatic change during and immediately after the altithermal era. Most elevation ranges and ecotones were used prehistorically and by the historic Utes living their seasonal round of hunting and gathering. The only aboriginal occupants of the area known to historic sources were the Ute Indians.

Approximately 2 percent of BLM administered lands have been inventoried for cultural values. Less than 100 sites have been recorded. All recorded sites are open camps, habitation, or special use sites and several are historic anglo-American sites. Only one rock art site has been recorded in the area and this now lies under Blue Mesa Reservoir. A few rockshelter habitation sites have been recorded. All data on sites are located at the Montrose District Office.

HISTORIC RESOURCES

The historic sites in the area are probably the most visible and visited of any cultural resources in the area.

Historical development in the Gunnison Basin and American Flats/Silverton areas has been one of transition marked by a changing perception of resource utilization. Initial and significant development began with prospecting and mineral extraction in the 1870s. The lure of potential mineral resources in the region, spurred by rich finds in the Central Rockies, prompted major yet often transitory settlement, forced treaty negotiations with Ute inhabitants, and fostered the construction of necessary transportation arteries through the mountains. With removal of the Utes in 1881 and the immediate entrance of the railroads, a second and more diverse period of development took place. Railroad transportation had a profound impact on the growth and consolidation of the mining industry in the period from 1881 to the turn of the century. Accessibility promoted new migration to the area, and town development took on a more permanent character. The substantial growth in the region after 1881 prompted a significant rise in agriculture and the livestock industry. River and creek drainage areas and vegetated bottomlands, mountain and hillsides were taken up and often over-exploited for farming and grazing purposes. The decline in the metals mining industry by the turn of the century further stimulated agricultural activity. By 1920 a third stage of development had already taken shape. Mining had declined to a point where only the most developed producers in the extremely rich mineral areas continued operations on a permanent basis. Coal mining had surpassed precious metals mining by this time. Cattle raising and related pursuits had become more profitable and more extensively practiced than mining in the Gunnison Basin region.

Modern use and occupation in the Gunnison Basin and American Flats/Silverton areas resembles very nearly those characteristics found in its latter stage of development. The notable addition of the tourist industry in recent times has stimulated renewed growth in former mining towns, while mining and ranching assume major roles in the economy of the region.

Historic resources within the Gunnison Basin region reflect the major historic periods of use and occupation. The known historic sites in the region consist primarily of mine and mine-related structures and sites. Railroad beds, ghost towns and modern townsites, ranchsite, and isolated cabins complement mining structures in representing significant historical development in the Gunnison Basin. Most of these historic resources are located on privately owned lands. Some cabins, millsites, and railbeds are found on BLM administered lands.

NATIONAL REGISTER CONSIDERATIONS

Consultation with the State Historic Preservation Officer, The Office of the State Archeologist, and the annual listing of *The National Register of Historic Places*, indicated the following properties are included in or are eligible for inclusion in The National Register of Historic Places: 5GN234, 5GN237, 5GN238, 5GN245, 5GN246, 5GN248, 5GN249, 5GN251, 5GN252, 5GN254, 5GN314, 5GN345, 5GN263, 5SA36, 5SA37, 5SA38, 5SA57, Crested Butte, Town of Crested Butte, Durango-Silverton Narrow Gauge Railroad, Silverton Historic District, and Lake City Historic District.

None of the above listed properties would be impacted by any of the alternatives.

Visual Resources

The entire Gunnison Basin and American Flats/Silverton EIS area lies in the physiographic region known as the Southern Rocky Mountains.

The general character of the EIS area is that of an east-west running, elongated bowl. River and stream drainages surround the area and flow predominately north and south into the major east-west drainage, the Gunnison River and Tomichi Creek. The lone exception is the south and west portion of the American Flats/Silverton area where the Animas River originates and flows south through an entirely different drainage system. The Gunnison is dammed twice forming a total of 28 linear miles of reservoir. The first and larger of the two bodies of water is Blue Mesa Reservoir, the second Morrow Point Reservoir. Beyond these impoundments to the west the Gunnison River flows from 'the bowl' through a narrow low point, the Black Canyon.

The basic highway and road system lies in or adjacent to the major drainage bottoms so that typical views consist of panoramas of pastoral foreground sagebrush hills and forested mountains in the distance. Many roads parallel the more highly scenic rivers and streams. The only area of concentrated habitation is the town of Gunnison.

Although the landscape character of the EIS Area differs from one part to another it will be discussed in terms of the landscape features (landform/water, vegetation, structures). (For a far more detailed description of landscapes refer to BLM 1979a and BLM 1979b.)

LANDFORM/WATER

The landform is quite diverse, with broad, slightly sloping valley bottoms, rolling foothills, precipitous and majestic mountain peaks, flat mesa tops, and steep and narrow river canyons. The major drainages are either pastoral, where sizeable flood plains exist, or canyon-like. Rock outcrops are frequent, especially in the higher elevations and along river canyons. The form of the landscape, as described, is very defined; the lines delineate exposed rock outcrops, roads and various skylined mesas, ridges and peaks; colors of the landform are predominately buff to darker brown; and textures are from moderately smooth to coarse.

Modifications to the natural characteristic landscape are not all visual intrusions. The cultivated fields of the valley bottoms are a good example of an improvement engineered by man. Other modifications to the landform include reservoirs, roads, power and telephone lines, substations, gravel pits, uranium exploration assay pits, and countless mines.

VEGETATION

Vegetation as a landscape feature in the EIS area is like the landform--very diverse. The plant material covering the largest zone in the EIS area is sagebrush. It is bordered at its lower limits by the riparian varieties and at the upper end by the mountain shrub zone. Ponderosa pine and Douglas fir are found on higher slopes below the spruce-fir. At timberline, above the spruce-fir, the alpine tundra contains an array of grasses, flowers, and forbs.

Color ranges from light to dark greens through spring and summer; to additions of reds, yellows, and oranges in the fall; to olive greens and browns with the winter season. Because of the vast variety in the vegetation it is hard to distinguish any typical examples regarding form, line, color, and texture.

The modification to the vegetation feature is a result of the modifications previously described under landform, because change in landform causes a reduction in plant material. Even in those areas where revegetation has occurred, the modified area is still apparent because the pioneer plants differ in composition and color with the characteristic surrounding landscapes.

With the variety of landscape character types and the many contrasting elements (form, line, color, and texture) within each landscape environment, the viewer is exposed to a number of environmental settings.

STRUCTURES

Structures, all man-made in origin, tend to be subordinate in most cases to the characteristic environment of the Gunnison Basin and American Flats/Silverton area. Examples of visual intrusions are the substation just east of Cimarron on Highway 50, 115, and 230 kV power lines crossing the northern portion of the EIS area, and the various uranium exploration pits that are located north and east of Powderhorn and either side of Cochetopa Creek centering around the Saguache/Gunnison county line. Other intrusions in the EIS area include microwave and reflector screens, radio towers, gravel pits, various roads with their associated cuts and fills, borrow pits, trash or dump piles, timber cuts, mines and related structures and tailing ponds.

VISUAL RESOURCE MANAGEMENT CLASSES

Visual Resource Management (VRM) classes represent the overall existing quality of the environment. They describe the degree of alteration that idealistically could be allowed within a characteristic landscape considering only the visual aspect of the environment. The VRM classes are therefore management objectives setting forth limits of allowable visual impacts. The basis for determining the degree of visual impacts of a modification is through the visual resource contrast rating method explained in Appendix VRM-1. Refer to Map 8 (Support Data) for VRM class boundaries.

Recreation

The Gunnison Basin area is renowned for its abundant and diverse recreation resources. The area is almost encircled by the Gunnison, Uncompahgre, San Juan, and Rio Grande national forests which provide numerous high country campgrounds and hiking/driving routes. These national forests had a combined total of 4,648,100 visitor days in 1977 (Forest Service).

Within the area, water based recreation is enjoyed at the Curecanti National Recreation Area which includes a series of three dams and reservoirs on the Gunnison River. Boating and fishing are facilitated by developments such as campgrounds, boat ramps, and a visitor center. This area recorded 865,900 visitor days of use in 1977 (National Park Service 1977).

The private sector provides mostly intensive recreation developments such as guest resorts, campgrounds, and ski areas. The Crested Butte ski area, a major winter sports outlet in the basin, accommodated 279,000 skiers in the 1975-76 ski season (Goeconer and Courtney 1977).

Public lands in the area, which range from the alpine peaks of American Flats to the rolling sagebrush hills of Gunnison Basin, provide mainly dispersed recreation activities such as hunting, fishing, hiking, snowmobiling, jeeping, and sightseeing. The BLM does provide three developed campgrounds; Red Bridge (5 units), Cebolla Creek (3 units), and

Mill Creek (22 units); their locations are shown on Map 9 (Support Data). Sanitary facilities are also provided along the heavily used Cochetopa Creek and "Loop Road".

Jeeping and sightseeing are major recreation activities due to the highly scenic location of the area, particularly the American Flats portion which lies in the heart of the San Juan Mountains. The most popular route of travelers is the "Loop Road" up the Lake Fork and Henson creeks via Engineer and Cinnamon passes. The loop is accessed from Lake City, Ouray, and Silverton. Jeep rental operations in these towns report over 29,000 passenger days of use in the vicinity; private vehicle use would be considerably higher than this figure.

The scenic nature of the area also invites the non-motorized recreationist. Trails for hiking/horseback riding are provided in the Powderhorn Primitive Area and in the American Flats area.

WILDLIFE

The Gunnison Basin is amply endowed with wildlife hunting and viewing opportunities. A major attribute to the basin is its elk and deer populations. These animals, while found during most of the year within the national forests, are dependent on public land for critical winter range. During this period they provide excellent opportunties for viewing from such major transportation routes as State Highway 50. While the amount of recreation days attributed to wildlife viewing in the resource area is not known, the Colorado Division of Wildlife (DOW) estimates that 64 percent of Colorado residents take time to specifically observe wildlife (DOW 1977).

Big game hunting provides both recreational and economic benefits for the area. Portions of five Big Game Management Units (see Map 10--Support Data) cover a majority of the area. Deer and elk hunting in these units provided 18,804 hunters with 82,277 recreation days in 1977 (Table 3-7). Of these hunters about 69 percent were Colorado residents. Other big game such as antelope, bighorn sheep, mountain goat, black bear, and mountain lion are also present and provided 575 hunters with 3,630 recreation days in 1977 (DOW 1977). A wide variety of small game is also hunted and trapped in the area with Small Game Management Unit 66 encompassing a majority of the EIS area. This unit provided 5,245 hunters with 40,859 recreation days in 1977 with the most popular species being coyotes and cottontail rabbits (DOW 1977).

FISHERIES

The Gunnison River, running through the heart of the area, has long been recognized as a blue ribbon fishery. This river as well as its many tributaries; Henson Creek, Lake Fork of the Gunnison, Tomichi Creek, Cochetopa Creek, Cebolla Creek, Blue creeks, and the Cimarron River provide many days of fishing enjoyment for cutthroat, rainbow, brook, and brown trout each year. As an indication of the extent of this use, in 1974 Gunnison County had the second highest amount of stream fishing use by state residents of all Colorado counties (6.5 percent). Non-state residents stream fished in the county more than any other (14.16 percent).

Hinsdale County receives less resident use on streams (19th highest in Colorado); however, nonresident use is fourth highest in the state (7.11 percent).

Lake fishing for kokanee salmon, rainbow, cutthroat, and brook trout in the area occurs on Blue Mesa Reservoir, Lake San Cristobal, Dome Lake, and the smaller alpine lakes which dot the higher elevations. Gunnison County has the 4th highest resident lake fishing use (5.5 percent) in Colorado while Hinsdale County receives only .94 percent of the state's resident use. The area attracts substantial non-resident use with Gunnison and Hinsdale counties being first (12.31 percent) and third (6.44 percent) in the state respectively (DOW 1974).

WILDERNESS/PRIMITIVE VALUES

In September 1973, 40,400 acres in southern Gunnison Basin were designated as the Powderhorn Primitive Area and managed in accordance with the Bureau's primitive area management policy and the Wilderness Act of 1964. The flat alpine tundra plateaus and forested drainages provide excellent primitive recreation opportunies with facilities being limited to trails.

Currently the area is grazed by sheep on the higher elevations and cattle in the lower parks and drainages. The East and Middle Forks of Powderhorn Creek, as well as Monument Park and Powderhorn Swamp, are heavily grazed by cattle which has resulted in significant stream bank and vegetation deterioration. This damage, in addition to the cattle defecation in and along streams, has substantially lowered the recreational enjoyment of these areas.

As directed by Section 603 of the Federal Land Policy and Management Act of 1976, all public lands are being inventoried for wilderness potential.

TABLE 3-7

DEER AND ELK HUNTING USE BY GAME MANAGEMENT UNIT (GMU)

Game Management Unit	Deer Hunters				Elk Hunters			
	R	NR	Totals	Recreation Days	R	NR	Totals	Recreation Days
54	1,433	943	2,376	8,110	2,076	1,393	3,469	16,498
55	1,132	352	1,484	5,509	2,702	1,083	3,785	17,671
551	643	47	690	2,438	1,303	196	1,499	7,659
66	656	364	1,020	3,607	1,190	785	1,975	9,106
67	531	200	731	2,839	1,277	498	1,775	8,840
Totals	4,395	1,906	6,301	22,503	8,548	3,955	12,503	59,774

Note: R = Residents; NR = Non-Residents

Source: Colorado Department of Natural Resources, Division of Wildlife, 1977 Colorado Big Game Harvest.

This was accomplished during 1978-79 for the Gunnison Basin Resource Area; the Powderhorn Primitive Area and 4,400 acres of contiguous land meet the criteria. Throughout the remaining portion of the EIS area, fifteen areas (see Map 9) totaling approximately 100,000 acres (15 percent of the resource area) were also found to possess the necessary wilderness characteristics (BLM 1979a, BLM 1979b).

Economics

POPULATION

The EIS study area is comprised of three counties; Gunnison, Hinsdale, and San Juan. Major towns in the area are Gunnison and Crested Butte in Gunnison County, Lake City in Hinsdale County, and Silverton in San Juan County. The 1970 population of the counties is shown in Table 3-8.

There are 125 ranching operations that have grazing privileges on public lands. Approximately 185 families with a population of 625 people are dependent upon ranching. This group comprises 5.6 percent of the EIS area's population.

INCOME

Income in four areas is directly affected by BLM's livestock grazing program. These areas are range livestock-related income, contract construction-related income, federal government-related income, and recreation-related income. There are also indirect income effects which result from the spending of direct income within the EIS area from the four direct income generating activities listed above.

As a base of reference for relative importance assessments, the 1976 personal income for EIS area residents was $37,892,000.

Range Livestock Related Income

In 1978 BLM provided about 50,914 AUMs to area ranchers. This accounted for 8.6 percent of the total vegetation needs of these ranchers.

Of the 185 families that derive income from grazing livestock 86 are dependent upon ranching as their primary source of income.

To identify the income generated by the 125 ranches it is necessary to group them by size and class of livestock. This is necessary since the scale of a livestock operation determines the net returns to the operation per animal unit of carrying capacity. These net returns are considered to be income to the families dependent on these ranches.

Table 3-9 shows the size categories into which the 125 ranching operations fall, average BLM vegetation use, gross revenue, and net revenue. Each of the eight categories was analyzed to determine the income characteristics resulting from ranch operations with present use levels of BLM vegetation. Gross revenue of the 125 ranches amounted to an estimated $9,640,100. This level of sales by livestock ranches influences business activity in other sectors of the EIS area economy. The business activity multiplier for the EIS area is estimated to be 1.8 (The Economy of Northeastern Colorado, Description and Analysis, prepared for BLM by Colorado State University). This means that every dollar of sales by the livestock ranching sector generates an additional 80 cents of sales in other sectors. Applying this multiplier to the present $9,640,100 gross revenue indicates that the sales of these 125 ranches generates another $7,712,080 of sales in the EIS area economy.

As shown in Table 3-9 total net income of the ranches is negative. Net ranch income is the amount of cash available for family living expenses, and to retire and/or service outstanding debts against land, improvements, livestock and machinery. The deficits shown in Table 3-9 mean that not only would there not be any income available for family living expenses, but off ranch income would be required to service debts, as well as to provide for family expenses. According to the 1974 Census of Agriculture, 48 percent of the ranchers in Gunnison and Hinsdale counties worked at least part time off the ranch. This income would help provide the necessary cash.

Table 3-10 indicates the relative dependency of ranches on BLM as a vegetation source for their operations. The ranching operations are affected to varying degrees by this dependency, depending upon the amount of dependency, the season the BLM vegetation is supplied, and the ease with which other vegetation could be substituted for the BLM vegetation if it were not available.

Construction Related Income

Implementation of many of the alternatives would require some construction and thus affect the regional construction industry. The 1976 contract construction-related personal income was

TABLE 3-8

EIS STUDY AREA POPULATION

	1970	Population 1979 (Projected) Low	Percent Change	High	Percent Change
County					
Gunnison	7,578	8,800	16.1	9,200	21.4
Hinsdale	202	500	147.5	600	197.0
San Juan	831	900	8.3	1,000	20.3
EIS Area	8,611	10,200	18.5	10,800	25.4
State	2,207,259	2,618,100	18.6	2,800,100	26.9

Sources: 1970 Census of Population; 1979 from Colorado Division of Planning, Demographics Section; Population Estimates and Projections.

TABLE 3-9

RANCH SIZE AND INCOME EFFECTS

Model	Cattle	Sheep	Number of Ranches	Average BLM AUM Use Per Ranch	Gross Revenue Per Ranch	Gross Revenue All Ranches	Net Revenue Per Ranch	Net Revenue All Ranches
I	0-249		55	196	21,516	1,183,380	-7,293	-401,120
II	250-549		30	540	56,612	1,698,360	-5,194	-155,280
III	550-749		9	815	136,739	1,230,650	14,627	131,640
IV	750 or greater		3	979	246,866	3,209,560	7,172	93,240
V		500-1,249	5	246	41,788	208,940	-1,409	-7,050
VI		1,250 or greater	6	130	259,696	1,558,180	18,944	113,660
VII	0-220	0-1,000	4	261	46,139	184,560	-1,014	-4,060
VIII	221-600	1,000-5,400	3	948	122,156	366,470	6,847	20,540
TOTAL			125			9,640,100		-208,430

TABLE 3-10

OPERATOR DEPENDENCY ON BLM GRAZING

Percent Dependency	Number of Ranches
0 to 10	36
11 to 20	20
21 to 30	20
31 to 40	13
41 to 50	8
51 to 60	5
61 to 70	6
71 to 80	7
81 to 90	5
91 to 100	5

TABLE 3-11

TAX BASE OF EIS AREA COUNTIES (1978)

County	Assessed Valuation	Average Mill Levy	Revenue
Gunnison	$33,402,420	70.56	$2,356,864
Hinsdale	6,502,920	39.67	257,965
San Juan	6,548,270	76.17	499,754

Source: State of Colorado, Division of Property Taxation. Eighth Annual Report to the Governor and the Legislature, 1978.

$1,414,000 in Gunnison County; less than $50,000 in Hinsdale County; and $68,000 in San Juan County (U.S. Department of Commerce, Bureau of Economic Analysis). This amounts to approximately 4.9 percent of total personal income in the region. With an income multiplier of 1.331 (BLM/SED) for this sector, total direct and indirect income generated by contract construction was approximately $2,039,100.

Recreation-Related Income

A wide variety of recreational activities is available in the EIS area. The area is noted for its hunting, fishing, and skiing. In addition, such activities as sightseeing and the Durango to Silverton narrow guage railroad attract many visitors.

Income generated by these activities is generally included in such categories as wholesale and retail trade, and services. The economic impacts of recreation are not currently known. However, a study by Colorado State University estimated sportsmen expenditures in the state. In 1973 $10,512,521 was spent by deer and elk hunters. Using the proportion of hunter days expended in the EIS area and updating to 1977 dollars the value of deer and elk hunting in the EIS area is estimated to be $2,841,020. Since this includes only deer and elk hunting the real income effect of recreation is considerably larger.

EMPLOYMENT

Changes in the amount of grazing on public lands could result in slight changes in employment in the EIS area. Ranches with BLM grazing privileges utilized approximately 173.05 man-years of hired labor. In 1977 the total labor force in the three county EIS area was 4,965 persons; of these 294 or 5.9 percent were unemployed. BLM currently utilizes 220 man months of labor per year on range supervision and project maintenance.

PUBLIC FINANCE AND TAX BASE

Livestock carried on ranches is assessed for payment of local property taxes. Changes in county property tax will be estimated from changing herd values for all alternatives. Also, there is a direct relationship between the market value of ranches and their associated income-generating livestock carrying capacity. Since some alternatives considered in this EIS would alter the allowable use (active use qualifications) associated with some ranches, there could be an effect occurring to alter the market value of these ranches. This could, in turn, alter the level of future assessed valuations.

Table 3-11 shows the assessed valuation, average mill levy, and property tax revenue for each county in the EIS area.

Social Conditions

SOCIAL WELL-BEING

There are several ways in which the social well-being of the 472 EIS area residents dependent on BLM grazing could be affected. Alterations in the personal income of the families involved would impact their material well-being, altering their relative standing with respect to economic opportunities in the EIS area society.

In addition, responses from participants at BLM planning meetings and information contained in the Black Canyon and San Juan Basin Socio-Economic Profiles, which include the EIS area, indicate a strong attachment to, and high level of acceptance for, traditional land uses. Livestock ranching falls into this category of uses. Any dislocation of individuals within the society from long-standing, accepted associations with livestock ranching could affect individuals within this group by altering their standing within the community or affecting the social surroundings of individuals with respect to a stable environment.

SOCIAL AND CULTURAL ATTITUDES

The following material has been obtained from BLM public participation analyses contained in BLM planning and information documents. Also used as a source were the Socio-Economic Profiles of the Black Canyon and San Juan Basin Regions which encompass the EIS area.

The people living in the EIS area can basically be classified as "rural western". Many area residents, especially those associated with livestock ranching with BLM vegetation dependency, trace their heritage to early mining and settlement efforts. They thus retain a strong attachment to the land and its traditional uses and the associated attitudes of independence and hard work.

Participation at public meetings by members of the ranching community in the EIS area indicates strong support for the multiple-use management philosophy and support for developments that would facilitate economic growth and orderly development of the region.

Members of rural communities in the EIS area have a strong feeling of community identity and view reasonable growth positively, since it provides the opportunity to repair and expand social infrastructure investments.

Livestock ranching is a long-established, accepted way of life in the region, with participants from the ranching community at BLM planning meetings expressing a strong conviction that continued livestock grazing on public lands is both desirable and necessary to supply food to regional and national markets. They also view livestock grazing as an essential element in maintaining a healthy economic base in the EIS area. Most livestock ranchers express support for installing range improvements (fencing, water developments, etc.) which would facilitate domestic livestock use.

In addition to the material presented above, the following discussion is included to indicate certain attitudinal elements which could explain why EIS area operators strive to remain in livestock ranching even though their capital investment and labor could earn greater monetary returns elsewhere.

A study done on cattle ranching in Arizona (Smith and Martin 1972), indicates the strong noncommercial motives of ranchers. This study is thought to be representative of attitudinal and motivational aspects of livestock ranching in Colorado and the EIS area. It points out the aspects of ranching as a consumption good, which means that ranches are not considered just as production units, but also as a means of preserving a particular lifestyle. Ranch owners are strongly influenced by the attitude of satisfactory levels of income and wealth consistent with being able to maintain a ranch related lifestyle. The three main attitudes which determine why ranchers stay on their ranches are land fundamentalism, conspicuous consumption/speculative, and rural fundamentalism.

Land fundamentalism was determined to be most important of the three with ranchers influenced by this attitude feeling that:

1. Land ownership permits them to feel closer to the earth;
2. Land ownership causes them to hold more fundamental personal values;
3. Ranch ownership allows them the opportunity of getting back to fundamental personal values;
4. Ranch ownership provides them the opportunity of owning land for its own sake;
5. Ranch ownership provides them a good place to raise children; and
6. Ranch ownership allows them to live away from cities at a place of their own.

Those influenced by conspicuous consumption/speculative attitudes would:

1. Feel that ranch ownership provides them the opportunity to speculate on ranchland;
2. Feel that they are actively speculating on the value of their ranchland;
3. Feel they are members of one or more exclusive social organizations;
4. Believe that holding ranchland for land appreciation purposes is worthwhile;
5. Not receive all their income from ranching;
6. Feel that ranch ownership provides them the opportunity to own land for its own sake; and
7. Feel that ranch ownership allows them to live away from cities at places of their own.

Ranch owners influenced by the attitude of rural fundamentalism would:

1. Live on their ranches most of the year;
2. Feel that ranch ownerships provides them a good place to raise children;
3. Have mostly other livestock raisers as friends;
4. Prefer ranching as a way of life for them in contrast to other occupations;
5. Feel that ranching as a way of life is highly important to them;
6. Feel that ranch ownership allows them to live away from cities at a place of their own;
7. Receive 100 percent of their income from ranching;
8. Feel that ranching ownership allows them the opportunity of getting back to fundamental personal values;
9. Feel that ranch ownership provides them the opportunity of owning land for its own sake; and
10. Have always lived on a ranch.

The above attitudinal information explains the motivational aspects of those involved in what would seem to outside observers as a very difficult, risky occupation with relatively low monetary rewards.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

IMPACT ANALYSIS ASSUMPTIONS

Assumptions

This chapter analyzes the environmental impacts that would be caused by implementation of the proposed action or one of the alternatives. In order to provide a standard framework for impact analysis and comparison among alternatives, the following analysis assumptions were used.

1. The allotment management plans would be implemented over an 8 year period following the MFP Step III decision.
2. Short term impacts are those which would occur during implementation (1981-1989): long term impacts are those projected 20 years after implementation (2005) when EIS objectives are being met.
3. The livestock grazing schedule chosen would be adhered to through at least one complete cycle and recycled if objectives of the AMP are being met: unauthorized livestock use would be strictly controlled and would not significantly impact the results of the rest schedule.
4. BLM will monitor the effects of the livestock management program and will make adjustments should studies show that objectives are not being met.
5. Allocation of additional vegetation resulting from improved rangeland management would generally be in the same proportions as those outlined in the MFP, and with consideration of resource needs and planning decisions at the time such vegetation becomes available.
6. BLM will have funding and manpower to develop and implement the AMPs.
7. All rangeland improvements will be implemented and maintained.
8. Colorado DOW will manage wildlife populations to conform with wildlife vegetation allocations.
9. All standard operating procedures listed in Chapter 2, and all current laws, regulations, and manual requirements will be followed.
10. Quantifications of impacts presented in this chapter should be used as estimates and best professional judgements, not as certainties. The best data and literature available were used to predict impacts. The general trends and ratios between impact levels outlined should be accurate; however, exact numbers, as in the case of expected vegetation response, may be slightly different when long-term studies are completed.

Energy Requirements and Conservation Potential

Implementation of any alternative would require motor vehicle fuel for rangeland administration and livestock management, diesel fuel to power heavy equipment for project construction, and in those alternatives proposing aerial treatments, aviation fuel.

It is assumed that fuel requirements would be similar for most alternatives except no action (which has few projects and no treatments). However, due to possible variations in project locations and acreages, it is not practical to quantify total fuel requirements.

Trip pooling and using smaller, more fuel-efficient vehicles are conservation potentials (BLM is currently pooling and using smaller vehicles). An additional conservation measure would be the use of a water-based rather than a diesel fuel-based chemical solution for vegetation treatments.

Format

Impacts in this chapter are discussed by alternative by resource element. That is, all of the resources that would be affected by an alternative are discussed under the heading of that alternative.

Non-Affected Resources

The climate, air quality, geology, topography, and mineral resources in the EIS area would not be impacted by any of the alternatives. Therefore they will not be discussed in this section or other impact sections.

MFP/Spring Rest Alternative (Proposed Action)--Impacts

Impacts on Vegetation

INTRODUCTION

The long-term impacts on the vegetation caused by the varying components of each alternative--rest schedule, period of use, allocation level, vegetation treatments, and range improvements--will be discussed and summarized in this section.

The major long-term vegetation impacts resulting from each alternative are shown by range site in Appendix V-2 and summarized in Table 4-1. The vegetation impacts are shown in terms of future species composition (percent by weight), production (total production per year per acre by weight), cover (percent basal), ecological condition, and apparent trend.

SAGEBRUSH-DOMINATED RANGE SITES

The sagebrush-dominated range sites are the dry mountain loam, mountain loam, mountain outwash, mountain swale, pine grassland, and subalpine loam (Gunnison Basin portion) range sites. They contain 84 percent (296,047) acres of the range site acreage in the EIS area. A 1978 range survey found these range sites to contain an average percent composition of sagebrush of 39. Eighty-six of the sagebrush-dominated range sites (263,384 acres) are currently in poor or fair condition as shown in Table 4-1.

The reduced allocation levels (a reduction in livestock use from 60,013 AUMs to 44,542 AUMs and a reduction of big game use from 36,141 AUMs to 34,200 AUMs), the vegetation treatments (96,168 acres of sagebrush), and adoption of the spring rest schedule are expected to result in an increase in production, cover, and condition on the sagebrush-dominated range sites.

Table 4-1 shows a change in average production from 518 (the existing situation) to 735 pounds/acre/year by 2005. Cover would increase from 18 to 26 (percent basal), and condition is expected to increase from 14 percent (43,051 acres) in good condition to 69 percent (213,577 acres) in good condition.

The modified allocation levels and the approximately 100,000 acres of vegetation treatment are expected to be the causal agents for the majority of the vegetation response shown, while grazing systems (rest/season of use and range improvements) are expected to be responsible for a lesser amount (approximately 10 percent).

Numerous researchers have shown that vegetation treatments significantly increase vegetation production, cover, condition, trend, etc., on sagebrush-dominated range sites. Among these are Shown et al. (1969), Wright (1974), Eckert et al. (1972), Bleak and Miller (1955), Ralphs and Busby (1979), Sheva (1972), Rauzi (1975), Hedrick et al. (1966), and Alley (1965).

That allocation levels are of greater importance than grazing systems in producing vegetation response is supported by the literature. Van Poollen and Lacey (1979) in a review of pertinent literature found that annual herbage production increased 27 percent (plus or minus 13 percent) and 35 percent (plus or minus 14 percent) when grazing intensity was reduced from heavy to moderate, and moderate to light, respectively. Implementation of grazing systems resulted in 13 percent (plus or minus 8 percent) increase in production. Thus, if livestock is reduced from heavy to moderate simultaneously when a grazing system is implemented, the reduced allocation would be expected to account for 73 percent of the herbage response, with grazing systems responsible for 27 percent of the response. This situation can be correlated to the allocation reductions and proposed grazing systems in the alternatives.

Frischknecht (1978), Martin (1978), and Valentine (1979) reiterated the importance of allocation in relation to grazing systems. In a study of the effects of grazing, environmental factors, and disturbances on the long-term productivity of sagebrush-grass ranges, Frischknecht found that intensity of grazing exerted greater influence on vegetation changes than systems of grazing. Martin noted, "No grazing system can succeed if the range is overstocked." Valentine stated, ..."(a) misconception is that specialized grazing systems are the long-awaited panaceas that will permit ignoring the other principles of grazing management. On the contrary, the evidence is overwhelming that they cannot replace the need for proper stocking rates, the use of species of grazing animals adapted both to the terrain and to plant species available on the site for grazing, and the use of a composite of many techniques for distributing grazing."

Under the MFP/Spring Rest Alternative, 96,168 acres of sagebrush would be treated, 15 percent by spraying, 70 percent by burning, and 15 percent by mechanical treatment. The impacts from vegetation treatment are shown as part of the vegetation response for the MFP/Spring Rest Alternative in

TABLE 4-1

VEGETATION IMPACT SUMMARY:
VEGETATION SITUATION AT 2005 DUE TO ALLOCATION, GRAZING SYSTEMS, AND VEGETATION TREATMENTS [1]

	Existing Situation [2]	MFP/Spring Rest Alternative 97% IM - 3% LI [3]	Fall Rest Alternative 97% IM - 3% LI	No Action Alternative 48% IM - 52% LI	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative 90% IM - 10% LI	Optimize Livestock Grazing Alternative 98% IM - 2% LI
SAGEBRUSH-DOMINATED RANGE SITES [4]							
TREATMENT acres of treatment		96,168	96,168	0	34,824	110,684	201,551
percent (%) type of treatment		15% spray 70% burn 15% mechanical	15% spray 70% burn 15% mechanical	NA	5% spray 80% burn 15% mechanical	5% spray 80% burn 15% mechanical	60% spray 25% burn 15% mechanical
SPECIES COMPOSITION percent (%) by weight	ARTE 39 [5] Grass 29	ARTE 25 Grass 48	ARTE 22 Grass 53	ARTE 47 Grass 24	ARTE 21 Grass 59	ARTE 18 Grass 55	ARTE 21 Grass 54
PRODUCTION pounds/acre/year	518	735	830	467	865	884	780
COVER percent (%) basal	18	26	28	17	32	34	30
CONDITION acres in each condition class							
Excellent	0	439 (1%)	439 (1%)	0	47,756 (15%)	27,750 (9%)	31,790 (10%)
Good	43,051 (14%)	213,577 (69%)	232,309 (75%)	10,555 (4%)	250,515 (82%)	273,346 (89%)	164,635 (54%)
Fair	143,724 (47%)	60,323 (20%)	42,420 (14%)	111,230 (36%)	8,164 (3%)	5,389 (2%)	16,922 (6%)
Poor	119,660 (39%)	32,096 (10%)	31,267 (10%)	184,650 (60%)	0	0	93,088 (30%)
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA	100% U	100% U	NA	100% S	100% S	30% S/70% D
Good	65% U/35% S	75% U/25% S	80% U/20% S	20% U/50% S/30% D	100% U	100% U	50% U/50% S
Fair	31% U/60% S/9% D	65% U/35% S	70% U/30% S	50% S/50% D	90% U/10% S	80% U/20% S	40% S/60% D
Poor	40% U/32% S/28% D	50% U/50% S	55% U/45% S	30% S/70% D	NA	NA	20% S/80% D

Note: NA = Not applicable.

TABLE 4-1
(continued)

	Existing Situation 2/	MFP/Spring Rest Alternative 97% IM - 3% LI 3/	Fall Rest Alternative 97% IM - 3% LI	No Action Alternative 48% IM - 52% LI	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative 90% IM - 10% LI	Optimize Livestock Grazing Alternative 98% IM - 2% LI
GRASSLAND/MEADOW RANGE SITES							
MOUNTAIN MEADOW							
TREATMENT acres of treatment		1,002	1,002	0	0	814	404
percent (%) type of treatment		15% spray 70% burn 15% mechanical	15% spray 70% burn 15% mechanical	NA	NA	5% spray 80% burn 15% mechanical	60% spray 25% burn 15% mechanical
SPECIES COMPOSITION percent (%) by weight	Forbs 31 Grass 51	Forbs 22 Grass 71	Forbs 19 Grass 74	Forbs 39 Grass 35	Forbs 18 Grass 78	Forbs 19 Grass 74	Forbs 38 Grass 34
PRODUCTION pounds/acre/year	1,495	2,100	2,200	1,400	2,300	2,300	1,525
COVER percent (%) basal	50	60	61	50	66	65	50
CONDITION acres in each condition class							
Excellent	0	0	0	0	1,469 (40%)	1,181 (32%)	0
Good	398 (11%)	2,140 (58%)	2,324 (63%)	0	2,203 (60%)	2,491 (68%)	404 (11%)
Fair	2,021 (55%)	1,432 (39%)	1,348 (37%)	1,652 (45%)	0	0	1,469 (40%)
Poor	1,253 (34%)	100 (3%)	0	2,020 (55%)	0	0	1,799 (49%)
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA	NA	NA	NA	100% S	100% S	NA
Good	100% S	70% U/30% S	75% U/25% S	NA	100% U	95% U/5% S	60% S/40% D
Fair	9% U/86% S/5% D	50% U/50% S	55% U/45% S	60% S/40% D	NA	NA	50% S/50% D
Poor	11% U/42% S/47% D	35% U/65% S	40% U/60% S	30% S/70% D	NA	NA	25% S/75% D

TABLE 4-1
(continued)

	Existing Situation 2/	MFP/Spring Rest Alternative 97% IM - 3% LI 3/	Fall Rest Alternative 97% IM - 3% LI	No Action Alternative 48% IM - 52% LI	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative 90% IM - 10% LI	Optimize Livestock Grazing Alternative 98% IM - 2% LI
GRASSLAND/MEADOW RANGE SITES							
SUBALPINE LOAM (American Flats/Silverton)							
TREATMENT acres of treatment		0	0	0	0	0	0
SPECIES COMPOSITION percent (%) by weight	Forbs 50 Grass 40	Forbs 30 Grass 55	Forbs 28 Grass 60	Forbs 58 Grass 30	Forbs 20 Grass 70	Forbs 25 Grass 65	Forbs 50 Grass 28
PRODUCTION pounds/acre/year	731	1,000	1,100	700	1,900	1,300	650
COVER percent (%) basal	18	30	33	16	45	40	15
CONDITION acres in each condition class							
Excellent	0	0	0	0	1,343 (20%)	336 (5%)	0
Good	61 (1%)	2,014 (30%)	2,686 (40%)	0	5,373 (80%)	4,701 (70%)	0
Fair	3,993 (59%)	2,351 (35%)	1,679 (25%)	2,686 (40%)	0	1,679 (25%)	2,351 (35%)
Poor	2,662 (40%)	2,351 (35%)	2,351 (35%)	4,030 (60%)	0	0	4,365 (65%)
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA	NA	NA	NA	100% S	100% S	NA
Good	43% U/57% S	70% U/30% S	75% U/25% S	NA	100% U	90% U/10% S	NA
Fair	55% U/43% S/2% D	65% U/35% S	70% U/30% S	40% S/60% D	NA	85% U/15% S	30% S/70% D
Poor	60% U/40% S	85% U/15% S	90% U/10% S	50% S/50% D	NA	NA	40% S/60% D

TABLE 4-1

FOOTNOTES

1/ The figures shown represent the estimated range of response of the vegetation to the alternatives. Methodology used in determining the figures is in Appendix V-3.

2/ The figures in the existing situation represent an average of all the 1978 range surveys within each range site. Unsuitable acres (densely wooded areas or steep slopes) for livestock grazing were not sampled, and are not included on the tables.

3/ IM = Intensive management; LI = Less intensive management.

4/ Includes the Dry Mountain Loam, Mountain Loam, Mountain Swale, Mountain Outwash, Pine Grassland, and the Shallow Subalpine Loam range sites. The Gunnison Basin portion of the Subalpine Loam range site is also included.

5/ ARTE -- usually *Artemisia tridentata vaseyana*; but may be *Artemisia nova*, *A. cana*, or *A. rothrockii*.

Grass -- usually grass species, but also may include grasslike plants (sedges, rushes) for the mountain meadow range site.

Table 4-1. Appendix V-2 shows the vegetation impacts by range site from allocation and grazing systems, and also from allocation, grazing system, and vegetation treatments. The difference is due entirely to vegetation treatments.

The impacts from the vegetation treatments are based on the assumptions that: (1) livestock grazing on treated areas would not exceed 60 percent of the current plant growth and a 2 year rest from grazing would occur after each treatment; (2) areas with a low perennial grass composition would be seeded following treatment; and (3) retreatment would be conducted if necessary before 2005 to control sagebrush reinvasion.

Several researchers have found that sagebrush reinvasion will take place within 10-20 years after treatment. Among these are Hendrick et al. (1966), W. M. Johnson (1969), Johnson and Payne (1968), and Bleak and Miller (1955). Retreatments are built into the annual maintenance costs for treatments and range improvements.

Figure 4-1 shows the potential for increasing vegetation production through mechanical treatment, and the importance of proper grazing management following treatment to prevent reinvasion of sagebrush. The area to the right of the fence line contains a high density of crested wheatgrass and sparse sagebrush while the area to the left contains very dense sagebrush and a low percent composition of grass. Both areas were plowed and seeded in 1965 (R. Vecchia, personal communication). The area to the right of the fence line has been excluded from livestock grazing, while the area to the left has received heavy spring and fall cattle grazing.

The impacts on Table 4-1 and Appendix V-2 are based on the assumption that proper management would occur on burned areas (67,318 acres). Proper management includes burning at the correct season, seeding burns when necessary, and controlling infestations of sprouting shrubs or undesirable forbs. If this is not the case the impacts would be significantly worse than shown. The following is a discussion of desirable and undesirable management of burned areas.

A single fire may remove sagebrush from a plant community (Heady 1975). However, unless sufficient understory of grasses exists before burning, the fire may not carry on sagebrush ranges. Grazing before a fire reduces the fuel supply and would further compound the problem of insufficient understory (Heady 1975).

The season of burning affects the type and vigor of plant species present after the fire. In general, burning during the growth period of a plant species is more detrimental to the plant than burning during the dormant period (Young and Bailey 1975). Wright and Klemmedson (1965) found that burning in early summer killed perennial bunchgrasses and increased annuals such as cheatgrass. Fall burning is one of the best treatments to retain desirable forbs and to kill sagebrush although it temporarily harms grasses such as needle-and-thread and Idaho fescue (Blaisdell 1953, Conrad and Poulton 1966). These grasses would be damaged more severely, however, by burning in the summer when they are green. Rhizomatous grasses are favored by fall burning (Blaisdell 1953).

Sprouting shrubs such as rabbitbrush or horsebrush may become extremely abundant on burned areas, and may reduce or eliminate any positive effects in increased vegetation potential. These plants possibly could be controlled by spraying the burned areas with a herbicide. Rabbitbrush and horsebrush are very susceptible to damage from herbicides while in a sprouting stage. Undesirable forbs such as lupine may infest the burned areas and also could be controlled with a herbicide.

Perennial grass species usually will not respond immediately after a burn. In fact, an initial decline in grass cover may occur 1 or 2 years after the burn (Ralphs et al. 1979). Part of the reason for the initial decline is that water repellency of soils may occur after a sagebrush burn (Salih et al. 1973). It may take several seasons for grass species to increase substantially in vigor and production. If livestock grazing is not controlled while the range is recovering after a burn, very heavy grazing likely would occur on the burned areas which may quickly nullify any positive effects as a result of the burn. Grazing animals would frequently concentrate on a burn because the feed is more palatable, more nutritious, and more readily available (Wright 1974). Some authors have suggested that all ranges should be protected from grazing following a burn to allow grasses time to gain vigor; otherwise, reoccupation by sagebrush may be rapid, or rabbitbrush may infest the burn (Stoddart et al. 1975).

As with spraying and mechanical treatment, sagebrush would eventually reinvade the burned areas. Although sagebrush may slowly increase in the burned areas without grazing, the rate of sagebrush reinvasion is more rapid in grazed areas. Retreatment of the burned areas is necessary to maintain the positive effects of sagebrush-burning (Harniss and Murray 1973).

Following is a discussion of the impacts and expected vegetation response from sagebrush spraying. The quantified vegetation impacts are shown on Table 4-1.

While sagebrush and forbs (broadleaf plants) would be damaged or killed by sagebrush spraying, established grass plants would be essentially un-

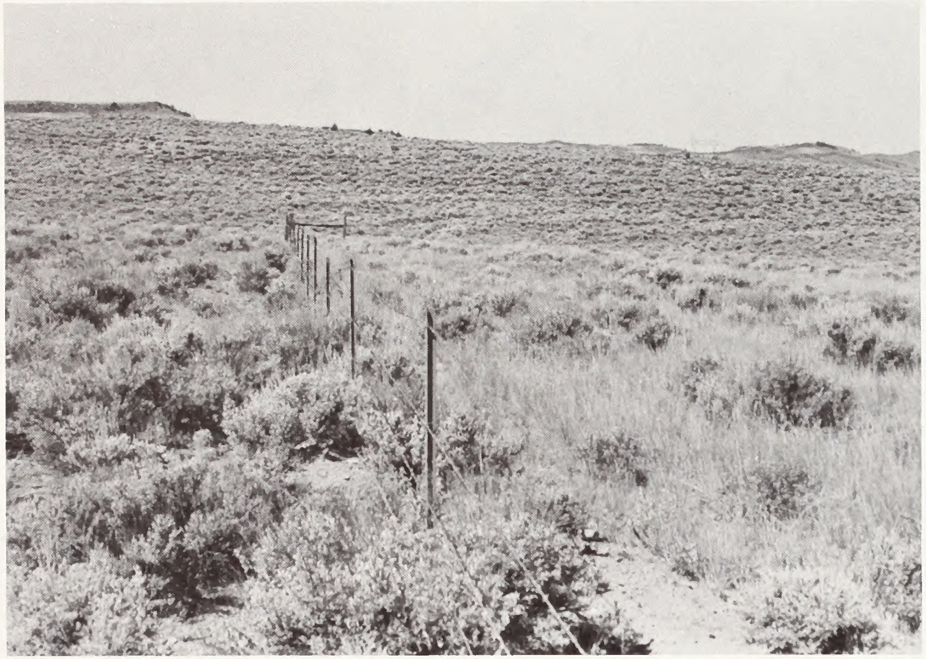

Figure 4-1. Kezar Basin Exclosure (1979) showing potential of vegetation treatments and importance of proper management following treatments. The area shown was plowed and seeded in 1965. Livestock were excluded from the land to the right of the fence line, and grass is vigorous and dense while sagebrush is relatively sparse. The land on the left of the fence line has received heavy spring and fall grazing. Grass is sparse and of low vigor, while sagebrush is very dense.

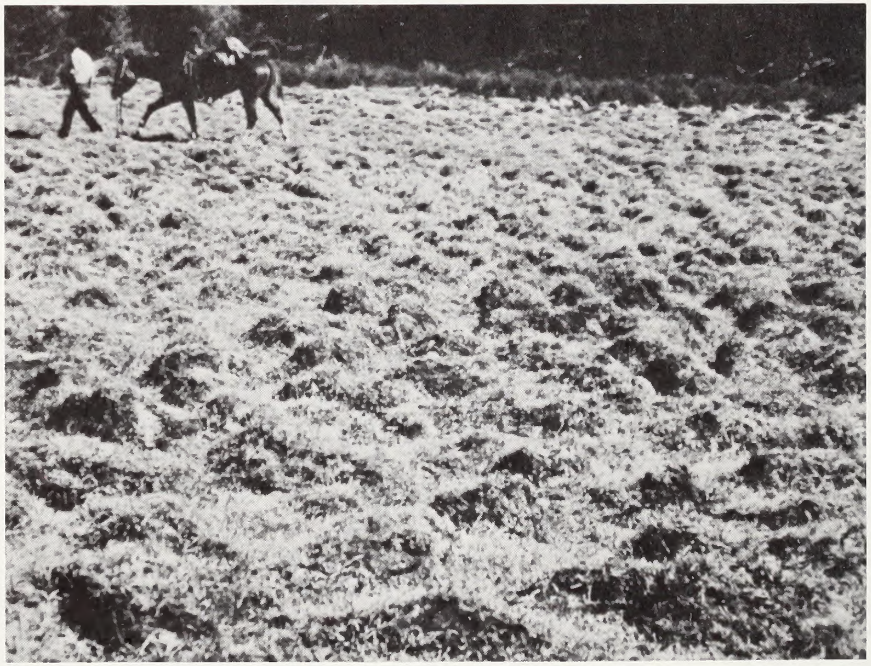

Figure 4-3. Hummocking of soil in the mountain meadow range site due to heavy concentrations of livestock.

harmed. The type and amount of broadleaf species killed would depend on the time of spraying in relation to the phenology of the the treated areas. Spraying is generally most effective at eradicating a plant when the plant is actively growing and has a maximum amount of leaf surface. Spraying before plants have fully leafed out, or when they are near maturity would result in a low percentage kill. Spraying when the plants are under drought stress during a poor moisture year, and thus, semi-dormant, would result in little success (Murphy et al. 1976).

The bulk of the spraying would be done in the early spring, at a time when sagebrush is most susceptible to herbicide treatment. However, spraying when sagebrush would be most effectively controlled may not adequately control rabbitbrush species, which are very abundant in many areas in sagebrush-dominated range sites. A second spraying, later than the first, may be necessary to control rabbitbrush. If no attempt is made to control rabbitbrush as well as sagebrush in the treated areas, rabbitbrush may become very abundant, and may nullify any positive effects of treatment in increased perennial grass production.

Some adverse effects may occur on bitterbrush, an important big-game vegetation species if spraying is done in the late spring or early summer (Sneva and Hyder 1966).

Grasses would start to increase vigor immediately after spraying, yet may not show a significant increase in herbage production until one to two seasons or more after treatment (Cook 1963; Eckert et al. 1972). Some researchers have indicated it may be beneficial to limit livestock grazing on sprayed areas after treatment, since increased grass production often lags behind spraying that length of time (Eckert et al. 1972).

The range improvements proposed for the MFP/Spring Rest Alternative (spring developments, fence, pipeline, wells, cattle guards, reservoirs, and stock trails) are needed to implement the grazing systems proposed in the alternative (97 percent--297,242 acres of the sagebrush range site acreage in the EIS area is proposed to be managed under intensive management). The improvements would result in more uniform use of the rangeland by increasing livestock accessibility and thus making additional vegetation available while at the same time relieving use of overgrazed areas (Williams 1954).

Some livestock poisoning problems have occurred in the EIS area from low and tall larkspur (cattle) and sneezeweed (sheep). Potential exists for livestock poisoning from western false hellebore (sheep), lupine (cattle), pinque (sheep), chokecherry (cattle and sheep), pigweed (cattle and sheep), chenopodium (cattle and sheep), and horsebrush (sheep), all of which occur in the EIS area (James and Johnson 1976).

The improvement in vegetation condition and trend expected mainly as a result of the lower allocation levels proposed in the MFP/Spring Rest Alternative (see Table 4-1) should result in an unquantifiable reduction in occurrence of livestock poisoning in the EIS area. This reduction is supported by the findings of Stoddart and Smith (1943) *in* Merrill and Schuster (1978). They stated that poisonous plants, with few exceptions, are invading species or those that increase with heavy grazing use. Generally, animals do not graze them by choice and are rarely poisoned when they have an abundance of good vegetation. Most losses from poisonous plants are caused when animals are hungry due to poor vegetation conditions brought about by overgrazing. With reduced grazing use and subsequent improvement of the range, the density of poisonous plants would decrease.

GRASSLAND/MEADOW RANGE SITES

The range sites which are not dominated by mountain big sagebrush (*Artemisia tridentata vaseyana*) are the mountain meadow and subalpine loam (American Flats/Silverton portion). They contain just 3 percent of the range site acreage in the EIS area. The mountain meadow range site is in areas adjacent to streams or on wet meadows which contain a high water table. This range site is equavalent to and contains vegetation characteristic of the riparian zone described in Chapter 3, and will be discussed in the Riparian section.

The subalpine loam range site is separated into two sections for analysis purposes, based on the presence or absence of sagebrush. The low elevation (Gunnison Basin portion) of the range site was found to contain an average percent composition (by weight) of sagebrush of 32, and was discussed in the previous section. The higher elevation (American Flats/Silverton) portion of the range site is devoid of sagebrush. This portion of the range site usually occurs as dry, open meadows at 9,000 to 11,000 feet, bordered by aspen or spruce-fir forests.

The impacts of the proposed allocation rates and grazing systems are shown on Table 4-1. In the subalpine loam range site (American Flats/Silverton) production would increase from 731 (existing situation) to 1,100 total pounds/acre/year by 2005. Cover would increase from 18 to 30 percent basal at 2005. Condition would change from 1 percent (61 acres) in good condition to 30 percent (2,014 acres) in good condition at 2005. The species composition of forbs would go from 50 percent (by weight) to 30 percent at 2005, while grasses would change from 40 percent to 55 percent. The responses would be due largely to the reduced allocation rates proposed in the MFP/Spring Rest Alternative. Allocation is responsible for 90 percent of the vegetation response shown, while rest/period of use and range improvements would be responsible for 10 percent (5 percent each). The minimal response from rest/period of use would be due to the inability of the spring rest schedule to take into account seasonal storage of carbohydrates in grass plants, and to provide periodic rest at the time when most grass species are actively restoring stored reserves (late summer or early fall--the predormancy period of grasses). This is discussed further under sagebrush-dominated range sites.

The vegetation response of the subalpine loam range site (American Flats/Silverton) would be of a larger magnitude than that for the sagebrush-dominated range sites (see Table 4-1). This would be due to the suppression of perennial grass species by sagebrush, which is absent in the subalpine loam (American Flats/Silverton) range site. Robertson (1947) in a study of the competition between grass and sagebrush found that mature sagebrush plants dominated the area within a radius of roughly one meter. Blaisdell (1949) studied the competition between sagebrush seedlings and reseeded grasses. He found that high yields of grass were generally associated with low yields of sagebrush. Suppression of established plants was chiefly responsible for yield differences rather than failure of plants to become established.

ALPINE SLOPES RANGE SITE

The alpine slopes range site is equivalent to the alpine vegetation zone discussed in Chapter 3. Alpine slopes have not been discussed in the previous sections, because these areas are unique from the other vegetation types and range sites. Vegetation responses to change in management and to disturbances are extremely slow in the alpine. Willard and Marr (1971) have suggested that it may take anywhere from several hundred to 1,000 years for a climax (Kobresia dominated) alpine plant community on wind-swept ridges to naturally recover following disturbance.

Because vegetation change is slow, no change, or a very insignificant change, under any of the alternatives is expected by 2005 in the majority of the alpine zone. However, certain areas, such as riparian areas, wet meadows, and the lower portion of the alpine zone (near timberline), may show a quicker vegetation response than the rest of the alpine region. The vegetation trends shown on Table 4-1 for mountain meadow and subalpine loam (without a sagebrush overstory) reflect the general expected response of these portions of the alpine zone.

The most significant vegetation impact in alpine areas due to livestock grazing in the past has been as a result of sheep trailing, particularly on wind-swept ridges, which are devoid of snow for much of the winter. Sheep trailing has exposed bare ground in a terrace-like pattern (see Figure 4-2). The problem is compounded by ice particles blowing at severe velocities during winter and damaging the vegetation at the periphery of the bare ground, causing the vegetation to recede further.

Since, as indicated above, the response of alpine vegetation to disturbances is extremely slow, the "terracing" may be a result of past sheep stocking rates in the American Flats/Silverton area when there were twice as many sheep as the current levels.

Little recovery of the terraced areas is expected by 2005. However the damage is not expected to worsen.

RIPARIAN ZONES

Riparian zones in the EIS area can be identified by the presence of vegetation that requires free or unbound water or conditions and more moisture than normal (see Aquatic Wildlife section). As such the mountain meadow range site corresponds with the riparian zone, since mountain meadow sites are naturally irrigated and subirrigated, occurring adjacent to streams or in wet meadows. Consequently, the vegetation impact figures shown in Table 4-1 for the mountain meadow range site reflect the vegetation impacts in the riparian zone.

Production under the MFP/Spring Rest Alternative would increase from 1,495 (existing situation) to 2,100 pounds/acre/year by 2005 due to the reduced allocation rates, 1,000 acres of vegetation treatment, and the proposed grazing systems. Cover would go from 50 to 60 percent basal, while condition would increase from 11 percent (398 acres) in good condition to 58 percent (2,140 acres) by 2005. The species composition of forbs would decrease from 31 to 22 percent (by weight) while grasses would increase from 51 to 71 percent by 2005. There would be a general trend towards replacement of undesirable forbs and grasses (those which are low in palatability to livestock) with desirable forbs and grasses.

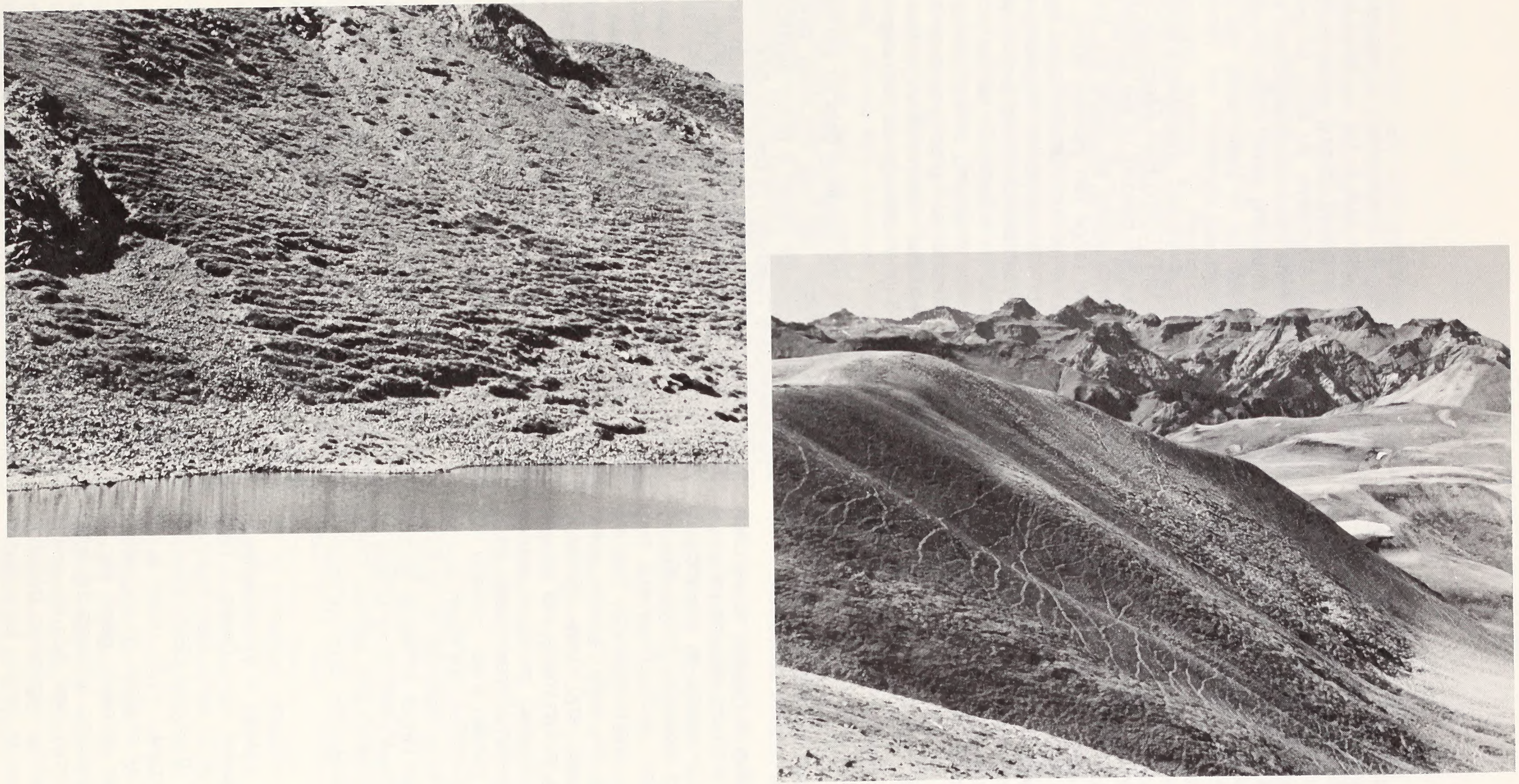

Figure 4-2. Sheep trailing damage in alpine areas. Many years of sheep trailing has exposed bare ground in a "terrace-like" pattern. The problem is worsened by ice particles blowing at severe velocities during winter. The plants are damaged at the periphery of the bare ground, causing the vegetation to recede further.

Livestock grazing presents a unique management problem in riparian zones. Stoddart et al. (1975) stated that cattle congregate in choice grazing areas such as meadows and canyon bottoms, where local overgrazing may cause serious erosion. Appendix V-2 shows a 20 percent increase in the acres in good condition for the mountain meadow range site, due to allocation and grazing systems (without vegetation treatments). This is lower than the corresponding increase for the subalpine loam (29 percent) and sagebrush dominated range sites (25 percent) in spite of the fact that the mountain meadow range site has the highest potential productivity (3,000 pounds/acre/year--see Appendix V-2). This is primarily due to the tendency for cattle to congregate in the riparian zones. The problem is illustrated on Figure 4-3, which shows hummocking of soil in the mountain meadow range site due to heavy concentrations of livestock.

The figures above, and in Table 4-1, represent the vegetation impacts of the entire mountain meadow range site (riparian zone). The specific impacts on the woody and herbaceous streambank vegetation, as a result of the allocation levels and grazing systems proposed in the MFP/Spring Rest Alternative, require more detailed discussion.

Livestock concentration in riparian zones often results in deterioration of woody streambank vegetation. Complete type conversion on streambanks may occur as a result of excessive grazing (Kennedy 1977). Willows, alders, and cottonwoods may slowly decrease in vigor and density until they are eliminated, leaving only the most "grazing resistant" unpalatable grasses and forbs (Kennedy 1977). In the EIS area, cottonwoods and aspens are very susceptible to livestock grazing in riparian areas. Very little regeneration of these plants takes place in heavily grazed riparian areas, primarily because the seedlings and suckers are eaten, and/or trampled. Willows are more resistant to grazing, and maintain themselves longer in heavily grazed situations. However, willows often show effects of cattle grazing in the EIS area, being trimmed into a tree-like form from close grazing near the base of the plants.

Existing data on streambank vegetation in the EIS area show that the majority of the streambank vegetation is in an improving trend. During a 1978 range survey, 3 percent (6.06 miles) were found to be in a declining trend, 19 percent (35.23 miles) in static trend, and 78 percent (143.31 miles) in improving trend. No data are available on vegetation condition (acres or miles excellent, good, fair, or poor) of streambank vegetation, although the criteria used to gather the above trend data are similar to those used for obtaining vegetation condition data (see Chapter 3, Riparian section for a discussion of the methods used to obtain existing streambank trend data). An improvement is expected in streambank vegetation due to the modified allocation levels and proposed grazing systems in the MFP/Spring Rest Alternative. By 2005, 86 percent (158.76 miles) of the streambank vegetation is expected to be in improving trend while 14 percent (25.84 miles) would be in static trend. No miles would remain in declining trend.

The allocation levels and vegetation treatments proposed in the MFP/Spring Rest Alternative would be responsible for the majority of the impacts discussed above and shown on Table 4-1 for the mountain meadow range site (riparian zone). Allocations and treatments would be the causal agents for 90 percent of the vegetation response, while grazing systems (rest/periods of use and range improvements) would be responsible for the remaining 10 percent. The reasoning behind the varying importance of allocation and grazing systems is discussed under sagebrush-dominated range sites and in Appendix V-3 (methodology for the vegetation impact tables).

Comparison of the condition data for the mountain meadow range site and the trend data for streambank vegetation reveal a better situation for the streambank vegetation (3 percent--6.06 miles in poor trend for the streambank vegetation as opposed to 34 percent--1,253 acres in poor condition in the mountain meadow range site). This can be explained by the inherent larger potential productivity of the areas immediately next to the stream (the streambank vegetation) in relation to the subirrigated areas further away from the stream (the mountain meadow site). The streambank areas respond quicker following use or disturbances, and would quickly show an improved trend. The mountain meadow range sites may take longer for recovery after disturbance or use.

The 992 acres of vegetation treatments proposed for mountain meadow range sites would be to control sagebrush or rabbitbrush which has invaded the range site due to lowering of the water table. In many cases improvements such as gully plugs would be constructed in conjunction with the vegetation treatments to restore the high water table which is characteristic of the mountain meadow range site.

ENDANGERED AND THREATENED PLANT SPECIES

Only two proposed endangered and threatened plants may even be remotely affected by livestock grazing in the EIS area. These are *Arabis gunnisoniana* and *Astragalus microcymbus*. The remaining four plants (*Senecio porteri, Stellaria irrigua, Cryp-*

tantha weberi, and *Gilia penstemonoides*) all occur on steep talus slopes or on metavolcanic or volcanic cliffs which provide little livestock forage and/or are out of reach of livestock.

No utilization of *A. gunnisoniana* by livestock was observed during extensive inventories of the plant in 1978 and 1979. *A. gunnisoniana* could potentially be impacted by vegetation treatments (spraying, burning, or mechanical treatments) although the adverse effects due to the treatments are expected to have no or a very minimal impact on the populations of the rare plant by 2005, for the reasons outlined as follows.

A. gunnisoniana occurs on slopes of varying steepness within the sagebrush zone of the Gunnison Basin. Consistent features of *A. gunnisoniana's* microhabitat are shallow soil and relatively low vegetation cover. Sagebrush often does not occur among *A. gunnisoniana*, presumably because of the droughty conditions of its habitat which is related to the steepness and shallow soil. These areas currently provide little livestock vegetation, and the benefits that may be gained from treating such sites would not be great enough to justify land treatments. The potential of the habitat for ever producing much livestock vegetation is very low. Consequently little adverse impact is expected on *A. gunnisoniana* populations due to vegetation treatments.

Astragalus microcymbus is utilized to a considerable extent by grazing animals. At one population, 61 percent of the plants examined in two frequency transects (38 plants) were grazed. Nearly every mature *A. microcymbus* plant was grazed and the majority of the ungrazed plants were seedlings. Presumably *A. microcymbus* is utilized by both livestock and big game. Deer, elk, cattle, and rabbit feces were found in the area of the *A. microcymbus* population.

Field examinations in 1978 revealed that *A. microcymbus* appeared not to be harmed by heavy early season grazing, but that, to the contrary, the absence of spring grazing may be undesirable for the perpetuation of the species. Grazed *A. microcymbus* plants were observed to readily initiate growth of new stems, habitat which assumed their elongate prostrate-spreading habit. It is known that *A. microcymbus* favors slightly disturbed soil--the original discovery of the plant was on a roadside growing with foreign weeds, and the two other known populations are in areas which receive heavy utilization by livestock and/or big game. Heavy grazing maintains a slightly disturbed condition in the plant community, which may encourage *A. microcymbus*. In the absence of grazing, the plant community would revert to a higher successional stage, which would be more closed to forbs favoring slightly disturbed soil, such as *A. microcymbus*.

Some *Astragalus* species are known as "loco weeds" for their capacity to cause addiction and poisoning of livestock. In a study of the nitrotoxins of dried *Astragalus* species mounted on herbarium sheets, Williams and Barneby (1977) found that *A. microcymbus* contains nitrotoxins. However, Williams et al. (1976) found that not all *Astragalus* species which contain nitrotoxins are poisonous to livestock, particularly in normal rangeland grazing situations. Williams and Parker (1974) conducted a herbarium study similar to that of Williams and Barneby's. They found that of 56 species which were found to contain nitrotoxins, only 2 were known to cause livestock losses. Consequently, although *A. microcymbus* contains nitrotoxins, it is thought that the concentrations are not great enough to cause livestock poisoning in normal grazing situations. This is strengthened by the fact that *Astragalus* poisoning has not been historically reported in the Gunnison Basin.

CONCLUSION

In the sagebrush-dominated range sites (which contain 85 percent of the range site acreage in the EIS area), production (total lbs/acre/year) is expected to increase from 518 (the existing situation) to 735 by 2005 due to the modified allocation levels, vegetation treatments, and proposed grazing systems MFP/Spring Rest Alternative. Cover (percent basal) would increase from 18 to 26 while the acres in good and excellent condition would increase from 14 percent (43,051 acres) to 70 percent (214,016 acres) by 2005.

The grassland/meadow range sites, which do not contain a dense sagebrush canopy, would also show increases resulting from the allocation levels, vegetation treatments, and grazing systems of the MFP/Spring Rest Alternative. The changes in production, cover, and species composition for the subalpine loam (American Flats/Silverton) and mountain meadow range site are shown in Table 4-1. In the subalpine loam range site, condition would increase from 1 percent (61 acres) in good condition to 30 percent (2,814 acres) in good condition by 2005. In the mountain meadow range site condition would increase from 11 percent in good condition (398 acres) to 58 percent (2,140 acres) in good condition by 2005. The mountain meadow range sight corresponds with riparian zones, and the impacts shown for mountain meadow sites in Table 4-1 apply to the riparian zone, except for the woody streamside vegetation. The trend of the streamside vegetation is expected to increase from 77 percent

(143.31 miles) to 86 percent (160.06 miles) in improving trend. Streamside vegetation is in better meadow sites largely due to the greater inherent productivity of streamside areas, and their ability to respond following use or disturbance.

The vegetation impacts discussed above and shown on Table 4-1 would be largely due to the reduced allocation levels and vegetation treatments proposed in the MFP/Spring Rest Alternative. Allocations and treatments are expected to be the causal agent for approximately 90 percent of the vegetation response shown, while grazing systems (rest/season of use and range improvements) would be responsible for the remaining 10 percent of the vegetation response.

The expected vegetation response of the alpine slopes range site by 2005, is expected to be minimal, and unquantifiable, primarily due to slow recovery rates of alpine areas.

No detrimental effect on endangered and threatened plants is expected as a result of the MFP/ Spring Rest Alternative.

Impacts on Soils

Soil erosion results in a deterioration in soil structure, loss of organic matter and biotic activity, and ultimately a reduction in soil productivity. Sheet and rill erosion rates are anticipated to decrease an average of approximately 27 percent (from 3.1 to 2.3 tons/acre/year) in the Gunnison Basin portion of the EIS area in the long term as compared to the present for this alternative. This decrease would be the result of an expected increase in vegetation cover and litter due to the proposed adjustment of livestock and big game use to the carrying capacity of each allotment and implementation of proposed grazing systems (Appendix S-2).

There would be no measurable change in erosion rates for the management units which continue their unallotted status for livestock, except for the two allotments in the EIS area which are presently being grazed and would become unallotted. The erosion rate would decrease approximately 40 percent on those units (from 3.1 to 1.9 tons/acre/ year).

The most significant erosion reduction is anticipated in locations (up to 97,170 acres) where vegetation treatments would be implemented, based on predicted increases in vegetation cover. Long-term erosion rates would be reduced approximately 65 percent from the present rate (from 3.1 to 1.1 tons/ acre/year) on the treated acreage (Appendix S-2). This is based on the assumptions that a high sagebrush kill ratio would be attained, a good vegetation and litter cover would be established, the vegetation would be only lightly to moderately utilized thereafter, and the area would be retreated if need be.

The short-term erosion rates after vegetation manipulation may increase depending upon the method used, the amount of bare soil exposed, and the soil and other physical characteristics of the treatment sites.

Sprayed areas would not be very susceptible to increased erosion due to the protection by dead standing sagebrush, litter, and grass (Pechanec et al. 1965; Sturges 1975). Soil contamination is not an anticipated problem where chemical control of sagebrush is exercised (Nielson and Hinckley 1975). Mechanical treatments, especially plowing, would increase the water and wind erosion rates for a short period by disrupting the surface soil structure (Gifford 1973, 1975). However, with techniques other than plowing, e.g., chaining, chopping, etc., a protective litter and vegetation cover is maintained, or with contour furrowing, runoff and erosion are contained by small dams. Plowing would be restricted to lands with little erosion potential where vegetation cover can be quickly established (Sturges 1975).

Burning could also increase water and wind erosion rates for 1 to 2 years until a protective vegetation and litter cover could be reestablished. The possibility of a burning treatment inducing water repellency in the underlying soils exists. This would result in increased runoff and erosion. The drier the soil and mulch prior to burning and hence the hotter the fire, the more likely it is that the water repellent spots of soil would be formed (Salih et al. 1973). The most affected period would be the first year after fire; thereafter, the infiltration rate of the soil would gradually recover (Hibbert 1976).

The affect of vegetation treatments on erosion cannot be precisely determined since the exact treatment sites and methods to be used have not been specified. However, approximate short-term erosion rates, as affected by vegetation treatments were estimated for the Gunnison Basin portion of the EIS area based on the best available data and professional judgment (see Appendix W-1). The erosion rates given are for the first year after treatment. The erosion rates would subsequently decrease in proportion to the increase in vegetation cover. Short-term erosion was deemed to be unaltered by sagebrush spraying. For purposes of analysis, the worst case situation was evaluated for areas where mechanical vegetation treatments would be implemented. An increase of 75 percent in the soil erosion rate, from 3.1 tons/acre/year to 5.5 tons/acre/year, was estimated for these areas. Sagebrush control by burning was predicted to increase erosion 56 percent, from 3.1 to 4.9 tons/ acre/year, on the treated acreage compared to the present rate. Overall, short-term erosion would be 4.7 tons/acre/year on up to 97,170 acres of vegetation treatments. Short-term erosion on untreated acreage would be the same as present erosion.

Livestock tend to concentrate in riparian areas causing stream trenching or channel widening, bank sloughing, and soil compaction (Ames 1977; Kennedy 1977). Three streams in the Gunnison Basin are proposed to be eliminated from livestock grazing and nine streams would be managed as separate management units using an intensive grazing system. Erosion is expected to be reduced in the non-grazed riparian areas and in the riparian zones along the latter nine streams, although streambank sloughing would still occur among the grazed streams. Erosion would probably remain near its present rate in other riparian areas where livestock use would continue to concentrate. Quantified data on streambank or gully erosion in the riparian zone in the Gunnison Basin are not available at the present time. However, the riparian zone essentially corresponds to the mountain meadow range site, so sheet and rill erosion would be decreased approximately 41 percent (from 0.13 to 0.08 tons/acre/year) compared to the present erosion rate.

Soil compaction results in lower infiltration rates and lower soil moisture content and thus becomes a limiting factor for plant production. The methodology used to estimate compaction is discussed the Soils section of Chapter 3. Soil compaction from livestock trampling is expected to be reduced and infiltration rates should increase about 8 percent for the Gunnison Basin over the long term. Vegetation treatments would reduce soil compaction approximately 32 percent on the treated acreage. These changes would occur as a result of an increase in vegetation cover and litter and reduced livestock trampling during the period when soils are wet. High compaction would still occur in the vicinity of livestock watering facilities, however.

Construction of range improvement facilities would increase short-term erosion rates in varying degrees in the immediate vicinity of the facilities. The erosion rate increase depends on the soil and other characteristics of the construction sites which have not been chosen at the present time. However, the disturbed acreage would be so small, that, it would not affect the overall erosion rate in the EIS area.

Sufficient resource data needed to determine the affect of this alternative upon erosion in the American Flats/Silverton region are unavailable at present. Erosion rates in alpine zones are largely unknown and the precise effects of livestock grazing practices upon these erosion rates need further study. Alpine soils are more complex and variable than soils at lower elevations (Thilenius 1975), which increases the difficulty of determining the erosion rates. However, field examination indicates that wind and rill erosion and gullying, in localized areas where the vegetation cover has been disturbed, are the principal soil loss problems. The generally low soil loss tolerance and extremely slow vegetation recovery rates make these erosion problems critical in the alpine zone. Adherence to range readiness criteria should reduce further physical soil damage by livestock. However, the slow recovery rates would allow only a slight decrease in present erosion rates and minor healing of trailing scars. Anticipated reduction of trampling on wet soils by adherence to range readiness criteria should decrease soil compaction.

The subalpine loam range sites in American Flats/Silverton do not support big sagebrush. Thus, their erosion rates cannot be equated with those for the same range site in the Gunnison Basin. A decrease in erosion rates, roughly proportional to the increase in vegetation basal cover (refer to Vegetation), is anticipated though.

Wind erosion is expected to slightly decrease in the EIS area as the present ground cover increases; however, the amount of decrease would be too small to measure.

CONCLUSION

In summary, long term soil erosion rates on rangeland in the Gunnison Basin portion of the EIS area are predicted to decrease approximately 27 percent (from 3.1 to 2.3 tons/acre/year) due to allocation and grazing systems and 65 percent (from 3.1 to 1.1 tons/acre/year) on areas where vegetation treatments would be implemented. Short-term erosion would be increased to approximately 1,084,601 tons/year due to vegetation treatments. Long-term erosion would decrease from the present erosion rate of approximately 929,129 tons/year to 569,466 tons/year. Soil compaction is anticipated to decrease 8 percent due to allocation and grazing systems and 32 percent on areas where vegetation treatments would be implemented.

Impacts on Water Resources

INTRODUCTION

A computer simulation model (HYDRO) was used to predict the surface runoff and erosion for each alternative (see Appendix W-1). The computer data were modified to represent local conditions;

however, several assumptions were made to fill data gaps.

For example, the mathematical equations in the model are not designed for use in alpine tundra conditions, e.g., the alpine tundra comprising a sizable portion of the American Flats/Silverton section of the EIS area. This area is characterized by steep slopes, shallow soils, and a short growing season. When overutilized by livestock (sheep), hydrologic adverse impacts such as gullying, increased sediment production, etc., occur requiring an extremely long period to recover pre-grazing conditions. According to Dasman (1978), after severe disturbance to tundra, recovery may seem to be indefinitely postponed. As a result, it can generally be assumed this area would react proportionately, but to a more severe degree than the hydrologic impacts noted for the lower elevation rangeland within the EIS area.

For all hydrologic assessments the annual volume of surface runoff calculated is only that produced from precipitation events during the grazing season, assumed to be May 1st through October 31st. However, during most years the surface runoff produced from snowmelt is of much greater magnitude than that produced from the grazing season precipitation events.

Since sediment production is not calculated by HYDRO, and it results from both surface and channel erosion (the second of which cannot be quantified), it is assumed for this EIS that sediment production varies proportionately to surface erosion, but at a different volume. Therefore, sediment changes throughout this EIS will not be expressed as an absolute number, but as a percent change from the present condition.

Due to the nature of the volcanic geology of the EIS area, livestock grazing in the short and long term under all alternatives would generally not significantly affect the area's water salinity concentration.

The following discussion on land treatments is applicable to all of the alternatives. Since different mixes of range sites are proposed for land treatments under each alternative, the quantification was given in percentages in the following general discussion; however, each alternative presents quantification figures based on the proposals of the respective alternative.

In general, for all vegetation treatments that reduce sagebrush, a reduction in snow accumulation on windward slopes can be expected (Sturges 1975). In most cases, the snow would just be relocated to another part of the watershed or to a nearby basin and small quantities would be sublimated. So, the total water yield for the basin would not be noticeably affected although localized areas where reduced snow accumulation occurs would be deprived of an unquantifiable amount of soil moisture necessary for spring vegetation growth and germination of seeded species.

The areas proposed for burning may exhibit water repellent soils after burning as found by Salih, Taha, and Payne (1973). Generally, this response of a site to fire would depend upon initial site characteristics (topographic slope, etc.), fire behavior, and storm characteristics subsequent to burning.

Studies (Buckhouse and Gifford 1976; and Wright, Churchill, and Stevens 1976) have also noted sediment and nutrient flushes after burning. However, on all land treatments proposed in this EIS, buffer strips along all stream channels are incorporated which should mitigate the majority of sediment and nutrients produced from areas burned.

The areas proposed for chemical spraying should exhibit no significant increase or decrease in the infiltration capacity or the volume of surface runoff, although according to Nielsen and Hinckley (1975) increases in soil moisture and ground water are likely to occur. According to Ingels and Hibbert (1974), these increases would result primarily from the reduced amount of transpiration and to a lesser degree the diminished quantity of interception storage.

When compared to other vegetation treatments the most substantial decrease in infiltration capacities can be expected from plowing and seeding. The present infiltration capacity would be reduced by 23 percent, resulting in a 39 percent increase in the volume of surface runoff.

According to Gifford, Thomas, and Caltharp (1977) contour furrows will hold a portion of the surface runoff and sediment. The amounts of each depend on how the contour furrows are designed and constructed (size, spacing, etc.). Therefore, retaining the surface runoff on-site, in contour furrows, would increase soil-water recharge and decrease the potential for flood hazards.

According to Gifford (1975), "If there is a decrease in infiltration rates due to chaining activities, then the decrease will probably occur on chained-with-windrowing treatments, this being the result of rather severe mechanical disturbance of surface soils during the windrowing process." Therefore, on areas proposed for chaining with debris-left-in-place, no significant change in the infiltration capacity would be expected.

According to Gifford (1975) areas chained with debris-left-in-place result in a reduction of surface runoff below natural levels, due to greater surface detention storage and depression storage. Whereas sites chained and debris-windrowed should experience surface runoff greater than natural levels, this resulting from severe mechanical disturbance, compacting soils, etc.

According to Trumble (1976) pitting and root plowing increase surface detention storage which reduces the amount of surface runoff. The only increases in surface runoff would be associated with exposed soil.

Results from a study done by Hickey and Dortignac (1964) showed that pitting reduced surface runoff over a 3-year period by 12 to 24 percent, and a study done by Raugi, Lang, and Becker (1962) showed the infiltration rate after one hour increased 168 percent, from a moderately grazed pasture to a pitted pasture. Therefore, a decrease in the volume of surface runoff and an increase in the infiltration capacity can be expected on areas proposed for pitting.

WATER QUALITY

In both the short and long-term, rangeland improvements designed to redistribute livestock over much of the lightly grazed upland, would increase the distance of overland flow, reducing the likelihood of fecal pathogens reaching water courses.

Fencing spring developments to prevent livestock use would improve local water quality by an unquantifiable amount in the short and long-term by reducing fecal bacteria, the protozoan *Giardia lamblia*, and soluble nutrients from animal feces in area water courses.

On the 97,090 acres of proposed land treatments, the long-term sediment production would decrease by 39 percent. Although the short-term sediment production would increase 10 to 50 percent depending upon: type of stream (perennial, etc.), amount of annual precipitation, soil type and slope, vegetation density, type of treatment, and weather conditions at the time of treatment.

Due to the proposed grazing systems and intensities, on lands not scheduled for land treatments, the long-term sediment production would decrease by 27 percent. In the short-term, the sediment production would essentially remain the same as the present condition. See Appendix W-1 and Water Resources Introduction to Impacts for a discussion on sediment quantification.

WATER QUANTITY

Infiltration and Runoff

On lands not scheduled for land treatments, the proposed grazing systems and intensities would not create any significant change from the present in the short-term infiltration capacity and surface runoff volume. However, in the long term the infiltration capacity would increase by an average of 8 percent (from 1.91 to 2.07 inches/hour) and the volume of surface runoff would decrease by an average of 26 percent (from 0.2510 to 0.1852 acre-feet/sq mi/6 month grazing season). An increase in the infiltration capacity would make more water available for plant growth and ground water storage. The decreased volume of surface runoff would reduce peak runoffs (flood hazards), gullying, and sediment production.

In the short term, the average infiltration capacity (weighted average based on number of acres proposed for each major type of land treatment), combining all land treatments would decrease by 16 percent (from 1.92 to 1.61 inches/hour) while the average volume of surface runoff would increase by 25 percent (from 0.2510 to 0.3142 acre-feet/sq mi/6 month grazing season).

The maximum long-term reduction in surface runoff and increase in infiltration can be expected from areas where a combination of intensive rangeland management and land treatments are proposed. Therefore, on land treated areas, the infiltration capacity would be expected to increase approximately 31 percent (from 1.91 to 2.52 inches/hour) and the surface runoff would decrease 77 percent (from 0.2501 to 0.0574 acre-feet/sq mi/6 month grazing season).

The reduced amount of surface runoff expected in this alternative may prevent stock reservoirs, etc., from supplying water throughout the grazing season.

Ground Water

An increase in the area's infiltration capacity resulting from the reduction of livestock use and land treatments would increase the amount of soil moisture and possibly increase recharge to groundwater aquifers. The magnitude of this long-term, area-wide impact is impossible to predict.

Water Use

The total amount of water withdrawn by wells and stored by reservoirs would be 495 acre-feet annually. Livestock consumption would amount to 34 acre-feet annually.

There would be water lost due to evaporation from the proposed rangeland water improvements. However, due to the unknown surface area of developments, it is impossible to quantify these losses. Sediment production would be reduced where water storage by proposed stock reservoirs diminishes high peak flows. This sediment reduction would be both a long and short-term impact.

CONCLUSION

In the short term, the total sediment production is expected to increase between 3 and 16 percent, while the total volume of surface runoff for a 6 month annual grazing season would increase from 117 to 127 acre-feet.

In the long-term, the total sediment production would be reduced by 30 percent while the total volume of surface runoff for a 6 month annual grazing season would decrease from 117 to 68 acre-feet.

Impacts on Terrestrial Wildlife

Table 4-2 summarizes the impacts of this alternative (as well as the other alternatives) on the quality of the five habitat types for many of the terrestrial animals in the EIS area. A more detailed analysis of impacts is given in the text under each alternative. The seasonal habitat acreages described for big game in Chapter 3 under Terrestrial Wildlife should not change significantly with implementation of the selected alternative, even in the long term. However, the big game populations in the EIS area could be expected to change by different degrees depending on the alternative selected. Table 4-3 displays populations by alternative, comparing the present to the short term and to the long term by species of big game and by season. These figures were developed with the cooperation of the Colorado Division of Wildlife (DOW) as management estimates and, outside this document, should be used only as such.

The rangeland management plan described in the MFP/Spring Rest Alternative was culminated only after due consideration of all the recommended uses of the public lands in the EIS area. It was determined that reductions in both livestock and wildlife numbers would be necessary to prevent further degradation of the resource in certain areas. Therefore, reductions in elk numbers are recommended because in certain areas in combination with mule deer and livestock, they are abusing the range. The proposed big game vegetation allocations were determined after careful study of the condition of the seasonal ranges in coordination with the DOW.

Prior to the determination that there was a shortage of vegetation for elk alone (not considering overlap), the DOW had formulated plans to reduce elk herds because of winter damage problems with haystacks, orchards, and winter range. On much of the crucial winter range, reductions would be necessary even without livestock use. Although vegetation would be allocated for a 10 percent reduction in elk (from 22,919 AUMs to 20,650 AUMs), it would be allocated for "present" mule deer numbers (before the 1978-79 winter mortality, 12,415 AUMs), a 71 percent increase in bighorn sheep (from 394 AUMs to 675 AUMs), a 12 percent increase in pronghorns (from 378 AUMs to 425 AUMs), and present mountain goat numbers (35 AUMs). This would result in an overall reduction of vegetation allocated for big game by about 1,900 AUMs, or about 5 percent. At the same time, a 26 percent reduction (amounting to about 15,000 AUMs) in licensed use would be allocated for livestock. On the public land there is vegetation for both livestock and big game with some overlap (vegetation available to both big game and livestock), usually 10 to 30 percent. On crucial big game winter range, this overlap would be allocated to big game which in some cases would still not be enough to avert reductions in elk to prevent overutilization (above 50 percent) of the available vegetation. The overlap would be divided equally between livestock and wildlife in most of the area.

Winter range is continually decreasing as a result of increases in subdivisions, agricultural areas, and winter recreation. Therefore, it is important to balance animal numbers with the remaining available winter range. Information gained from browse transects run north of the Highway 50 combined with DOW's assessment of proper herd numbers in this area indicate a need for a 43 percent reduction in elk numbers (from 2,874 AUMs to 1,638 AUMs) west of Gunnison and a 30 percent reduction in elk numbers (from 2,176 AUMs to 1,523 AUMs) east of Gunnison. Elk numbers would also be reduced by 20 percent (from 1,920 AUMs to 1,536 AUMs) in the Kezar Basin area south of Highway 50 where there is competition in summer with livestock resulting in a declining condition and trend. These reductions, when considering the

TABLE 4-2

HABITAT QUALITY TRENDS FOR TERRESTRIAL ANIMAL SPECIES BY ALTERNATIVE

	MFP/Spring Rest Fall Rest					No Action					Elimination of Livestock Grazing on Public Lands					Optimizing Wildlife and Watershed Values					Optimizing Livestock Grazing				
	R	S	M	W	A 1/	R	S	M	W	A	R	S	M	W	A	R	S	M	W	A	R	S	M	W	A
Elk	+ 2/	+	+	= 2/	+	- 2/	-	-	=	=	+	+	+	+	+	+	+	+	+	+	-	-	-	=	-
Mule Deer	+	+	+	=		-	-	-	=		+	+	+	+		+	+	+	+		-	-	-	=	
Pronghorn		+					=					+					+					-			
Bighorn Sheep		+	+		+		-	-		=		+	+		+		+	+		+		-	-		-
Mountain Goat					=					=					+					+					=
Black Bear	+			=		=			=		+			+		+			+		-			=	
Mountain Lion	+	+	+	=		-	-	-	=		+	+	+	+		+	+	+	+		-	-	-	=	
Coyote	+	+	+	=		=	=	=	=		+	+	+	+		+	+	+	+		=	=	=	=	
Bobcat	+	+	+	=		=	=	=	=		+	+	+	+		+	+	+	+		-	-	-	=	
Beaver	+					=					+					+					-				
Muskrat	+					=					+					+					-				
Porcupine	+	+	+	=		=	=	=	=		+	+	+	+		+	+	+	+		-	-	-	=	=
Marmot	+	+	+	=	=	=	=	=	=	=	+	+	+	+	+	+	+	+	+	+	-	-	-	=	
Rabbits	+	+	+	=		=	=	=	=		+	+	+	+		+	+	+	+		-	-	-	=	
Hares	+	+	+	=		=	=	=	=		+	+	+	+		+	+	+	+		-	-	-	=	
Prairie Dog		+					=					+					+					-			
Ground Squirrels	+	+	+	=		=	=	=	=		+	+	+	+		+	+	+	+		-	-	-	=	
Sage Grouse	+	+				-	-				+	+				+	+				-	-			
Blue Grouse	+			=		=			=		+			+		+			+		-			=	
Sharptail Grouse	+	+	+	=		-	-	-	=		+	+	+	+		+	+	+	+		-	-	-	=	
Ptarmigan	+				+	-				-	+				+	+				+	-				-
Mourning Dove	+	+	+			=	=	=			+	+	+			+	+	+			=	=	-		
Waterfowl	+					-					+					+					-				
Shorebirds	+					=					+					+					-				
Raptors	+	+	+	=		=	=	=	=		+	+	+	+		+	+	+	+		-	-	-	=	
Passerines	+	+	+	=	+	-	=	=	=	=	+	+	+	+	+	+	+	+	+	+	-	-	-	=	-
Garter Snake	+		+	=		=		=	=		+		+	+		+		+	+		-		-	=	
Green Snake	+					=					+					+					-				
Gopher Snake	+	+	+	=		=	=	=	=		+	+	+	+		+	+	+	+		-	-	-	=	
Tiger Salamander	+					=					-					-					+				

1/ R = Riparian; S = Sagebrush; M = Mountain Shrub; W = Woodland; A = Alpine.

2/ (+) = Improve; (-) = Decline; (=) = No Change.

TABLE 4- 3

COMPARISON OF BIG GAME POPULATIONS BY SPECIES IN THE EIS AREA BY ALTERNATIVE BY SEASON

	Present			Short Term (1985)			Long Term (2005)		
	Winter	Summer	Yearlong*	Winter	Summer	Yearlong*	Winter	Summer	Yearlong*
MFP/Spring Rest									
Elk	8,500	2,700	200	8,000	2,700	140	9,000	3,300	210
Mule Deer	15,800	5,100	-	15,800	5,100	-	22,000	7,750	-
Pronghorns	-	-	150	-	-	200	-	-	500
Bighorn Sheep	120	140	90	150	175	100	180	210	140
Mountain Goats	25	-	-	25	-	-	45	-	-
Fall Rest									
Elk	8,500	2,700	200	8,000	2,700	140	9,000	3,300	210
Mule Deer	15,800	5,100	-	15,800	5,100	-	22,000	7,750	-
Pronghorns	-	-	150	-	-	200	-	-	500
Bighorn Sheep	120	140	90	150	175	100	180	210	140
Mountain Goats	25	-	-	25	-	-	45	-	-
No Action									
Elk	8,500	2,700	200	8,500	2,700	200	6,800	2,200	160
Mule Deer	15,800	5,100	-	15,800	5,100	-	12,600	4,100	-
Pronghorns	-	-	150	-	-	150	-	-	300
Bighorn Sheep	120	140	90	120	140	90	140	160	100
Mountain Goats	25	-	-	25	-	-	30	-	-
Elimination of Livestock Grazing									
Elk	8,500	2,700	200	8,500	2,700	200	12,800	4,100	300
Mule Deer	15,800	5,100	-	15,800	5,100	-	25,300	6,600	-
Pronghorns	-	-	150	-	-	150	-	-	640
Bighorn Sheep	120	140	90	120	140	90	160	190	120
Mountain Goats	25	-	-	25	-	-	35	-	-
Optimize Wildlife and Watershed Values									
Elk	8,500	2,700	200	8,500	2,700	200	12,800	4,100	300
Mule Deer	15,800	5,100	-	15,800	5,100	-	25,300	6,600	-
Pronghorns	-	-	150	-	-	150	-	-	640
Bighorn Sheep	120	140	90	120	140	90	160	190	120
Mountain Goats	25	-	-	25	-	-	35	-	-
Optimize Livestock Grazing									
Elk	8,500	2,700	200	4,000	1,300	100	4,000	1,300	100
Mule Deer	15,800	5,100	-	9,500	3,100	-	9,500	3,100	-
Pronghorns	-	-	150	-	-	100	-	-	100
Bighorn Sheep	120	140	90	80	90	60	80	90	60
Mountain Goats	25	-	-	25	-	-	25	-	-

*The yearlong populations are distinct groups of animals present in areas contained within the EIS area for the entire year. Summering animals and wintering animals may or may not spend the following season in the EIS area.

entire EIS area, amount to about 10 percent (from 22,919 AUMs to 20,650 AUMs) of the present elk AUM demand.

Livestock numbers would be reduced by an average of 26 percent in an effort to reach the proper stocking rate that would ensure that proper use factors would not be exceeded, sufficient vegetation would be available for a reasonable number of wild animals also using the rangeland, and that condition and trend would improve while the vegetation advances toward the potential plant communities for the various range sites in the EIS area.

The proposed vegetation treatments described in Chapter 2 are designed to reduce, but not eliminate, the disproportionate levels of sagebrush composition on many of the range sites in the EIS area. The goal of this effort would be to help restore these sites to the potential plant communities which would benefit nearly all wildlife species. These treatments would be constrained to ensure that mixtures of browse making up at least 25 percent of the vegetation composition would be maintained on crucial winter areas until the overall condition of adjacent sites improved. A 15 to 20 percent composition of sagebrush would be maintained near sage grouse strutting, breeding, and nesting areas. Seedlings and plantings of native species of shrubs, grasses, and forbs are planned for many of the treated areas. Also, south-facing slopes would be left undisturbed.

The impacts to the habitats of terrestrial animals would be based mainly on the changes in the vegetation communities. Besides vegetation allocation and treatments, these communities are affected by climate, periods of use, utilization, rest, animal distribution, etc. The habitats can also be impacted by fences, which affect livestock distribution and can hamper big game movement, and by water developments, which affect livestock distribution and possibly wildlife dispersal.

In analyzing the changes in vegetation characteristics on the various range sites under this alternative in Table 4-1 (Vegetation), it becomes apparent that the overall condition of the range sites in the EIS area would improve without vegetation treatment and would improve more quickly and to a greater degree with treatment. This is the basis of the improvement of most of the habitat types in the area under this alternative as depicted in Table 4-2 except for the woodland type which does not receive much livestock use, is mostly unclassified as to range sites, and would probably receive little if any vegetation treatment; hence, the woodland type would remain relatively unchanged.

Under this alternative, there could initially be an adverse impact to elk in terms of quantity because of animal reductions necessary to protect the habitat. However, these reductions would only be necessary if they have not already taken place through the mortality which occurred during the severe winter of 1978-79 in the Gunnison area. Aerial trend counts made by DOW during that winter indicated about 41 percent less elk were present west of Gunnison and north of Blue Mesa Reservoir than the previous year. This is the area where a 43 percent reduction in elk was recommended. During the same winter, 62 elk apparently broke through the ice on the south shore of Blue Mesa Reservoir and drowned, including 29 cows with fetuses. DOW considers it very probable that these animals were part of the herd of about 200 elk in Kezar Basin, where a 20 percent reduction was recommended. A loss of 62 elk would be a 31 percent reduction. The counts east of Gunnison indicate no loss in elk in this area.

Another adverse impact could occur initially to elk, mule deer, and pronghorns (especially in winter snow) with the addition of new fences until the animals become accustomed to their presence. After becoming accustomed to the fences, however, some animals would still not be able to negotiate the fences in deep snow and would perish.

Big game population numbers could be expected to increase in the long term as shown in Table 4-3.

THREATENED AND ENDANGERED SPECIES

This alternative would improve habitat for the black-footed ferret (by improving prairie dog habitat through increased availability of grasses and forbs), the peregrine falcon (by improving passerine bird habitat), and the bald eagle (by improving riparian habitat to benefit prey species such as waterfowl, rabbits, hares, and fish). The bald eagle would also benefit from increased quantity of cottonwood trees to use as perch sites and possibly nesting sites.

CONCLUSION

In the short term, this alternative would require a reduction in elk numbers, maintenance of mule deer and mountain goat numbers, and increases in bighorn sheep and pronghorn numbers. However, as rangeland conditions improved in the long term, vegetation would be available for increases in all species. Also, non-game species would not be affected in the short term, but would have improved habitat conditions in the long term.

Impacts on Aquatic Wildlife

Livestock grazing may adversely impact the aquatic/riparian habitat by eliminating streamside vegetation and by causing physical damage to the streambank through trampling. These two major types of adverse impacts may reduce cover, increase temperatures, decrease bank stability and increase erosion, reduce habitat for aquatic organisms resulting in a decrease in diversity and abundance and cause a general decline in fish populations (Armour 1973, Hubbard 1977). The impacts of the MFP/Spring Rest Alternative could vary considerably depending on the grazing system initiated, the management plans for the specific allotments, and the decisions made by land managers and permittees as to how best to utilize the available vegetation.

The impacts of the MFP/Spring Rest Alternative have been considered in terms of the condition of the aquatic/riparian resources at the time the surveys were conducted (in preparation for the Fisheries-URA-Step III) and this condition has been related to the level and type of use being implemented at that time. A comparison of these conditions with the proposed level and type of use in the MFP/Spring Rest Alternative has provided a means of estimating what the impacts may be and their general effect on the aquatic/riparian resource.

It is anticipated that a 25 percent reduction in existing livestock grazing would result in an improvement over the present situation. The number of miles of stream in poor condition should decrease by approximately 5 percent while those in fair condition are expected to decrease by about 8 percent causing a net improvement in total stream miles which would be reflected by a greater number of stream miles in the good category (see Table 4-4). The improving trend in aquatic habitat should coincide with the trend mentioned in the Vegetation portion of this EIS, since the aquatic/riparian habitat appears to function as a unit.

For those areas where the riparian habitat is currently in a declining trend or unsatisfactory condition, this situation would probably show some improvement. Based on the riparian habitat condition, 50.6 percent of the stream sections sampled have riparian zones that are in need of some type of improvement and the range trend seems to indicate that 20 percent of the riparian zones are in a static or declining state. The remainder of the streams inventoried were in a somewhat stable condition and it is expected that they should maintain their current condition under the MFP/Spring Rest Alternative. The declining trend of those riparian areas mentioned is expected to improve by approximately 3 percent under this alternative.

Initiation of the intensive management plans should provide some initial positive impacts on the streams involved. Under this grazing schedule, 77.7 miles of stream habitat would be affected. At the present time, the aquatic habitat along 4 miles of Alder Creek is in good condition. The aquatic habitat condition along 10.5 miles of Antelope and Sugar creeks is in poor condition and the remaining 63.2 miles are in fair condition. Any improvements in the aquatic/riparian habitat associated with the streams proposed for management under schedule F would be dependent on the amount of rest obtained through the grazing period selected by the permittee. The long-term impact of this action would be expected to be an improvement over the current situation by improving the aquatic and riparian habitat along approximately 14.0 miles of stream to good condition. This improving trend should cause the number of miles in fair and poor condition to decrease from 63 miles to 57.0 miles and 10.2 miles to 6.6 miles, respectively.

The proposal to eliminate Spring Creek, the north one-half of West Fork Antelope Creek, and part of the East Fork of Powderhorn Creek from grazing should have a significant positive impact on approximately 5.0 miles of acquatic and riparian habitat. It is anticipated that, under this action, approximately 2.0 stream miles would improve to an excellent condition while 3.0 miles of aquatic habitat would improve to, or remain in, good condition. Trailing along the East Fork Powderhorn may have an adverse impact on riparian vegetation and streambank stability if trailing occurs in the riparian areas.

Under the MFP/Spring Rest Alternative, vegetation in the EIS area would be treated by spraying 14,500 acres (15 percent) with chemical herbicides, burning 68,000 acres (70 percent), and mechanically treating 14,500 acres (15 percent). Since the majority of the aquatic/riparian systems are more commonly associated with the mountain swale/mountain meadow (MS/MM) range sites, it is doubtful that any significant direct adverse impacts to the aquatic/riparian habitat would result from treatments on the other range sites. There are a total of 4,610 acres proposed for treatment in the MS/MM range site.

It is anticipated that mechanical treatments should have little adverse impact on the aquatic/riparian systems provided the activities and machinery are kept well away from the stream/riparian areas. There could be some initial adverse impacts from erosion and sediment flow if there is not an adequate distance between the treatment area and the stream system.

TABLE 4-4

MILES OF STREAM ON BLM ADMINISTERED LANDS AFFECTED BY EACH ALTERNATIVE

Aquatic Habitat Condition 1/	Present Situation (miles)	MFP/Spring Rest Alternative		Fall Rest Alternative		No Action Alternative		Elimination of Livestock Grazing Alternative		Optimize Wildlife and Watershed Values Alternative		Optimize Livestock Grazing Alternative	
		ST	LT	ST	LT	ST	LT	ST	LT	ST	LT	ST	LT
gt 16 = Excellent	30.2 (16%)	NC	30.2	NC	30.2	NC	0.0	NC	56.7	NC	37.8	NC	0.0
14-15 = Good	66.2 (35%)	NC	90.8	NC	100.2	NC	39.7	NC	94.6	NC	132.4	NC	26.5
10-13 = Fair	71.8 (38%)	NC	56.7	NC	51.1	NC	90.8	NC	34.0	NC	15.1	NC	77.5
lt 10 = Poor	17.0 (9%)	NC	7.6	NC	3.8	NC	54.8	NC	0.0	NC	0.0	NC	81.3
ND = No data	3.9 (2%)	NC	3.9	NC	3.9	NC	3.9	NC	3.9	NC	3.9	NC	3.9
	189.0 (100%)		189.0		189.0		189.0		189.0		189.0		189.0

Note: ST = short term; LT = long term; gt = greater than; lt = less than; NC = no change.

1/ See BLM 1979a and 1979b for an explanation of stream profile.

The burning of vegetation is expected to have little adverse impact on the aquatic/riparian system, provided a fire break between the burn unit and riparian zone is established. This action would insure that the riparian vegetation is protected from the short-term impacts of excessive heat or the long-term impacts resulting from fire spilling over into the riparian zone and destroying the vegetation.

For a discussion on the potential short-term impacts of herbicide on the non-target aquatic and riparian areas refer to Sears and Meehan (1971) and Meehan et al. (1974). One of the major sources of contamination of the aquatic/riparian system (by herbicides) has been found to be caused by the drift of fine particles away from the target area (Hopkins and Howard 1971; Norris 1967; Kimmins 1975; Cameron and Anderson 1977). It is anticipated that since 75-foot minimum width buffer strips have been incorporated into the alternatives as guidelines during the spray program there should be little, if any, potential impact caused by contamination of non-target areas. For a discussion on the importance of buffer strips during herbicide application, refer to Appendix F-5. If vegetation treatment by the use of aerially applied herbicides is conducted in the Gunnison EIS area in a prescribed manner and under set guidelines, it is anticipated that (based on current information available) there should be no long-term impact on the aquatic and riparian ecosystem.

It is anticipated that there should be little adverse impact from the construction of cattle guards, stock tanks, pipelines, and wells provided ground disturbances and vegetation removal are kept at a minimum, especially in the vicinity of aquatic and riparian habitat.

Fencing could result in a positive impact on aquatic/riparian ecosystems if it is designed to control livestock which may have the potential to impact these two habitat types. The only potential adverse impacts would result from ground disturbances and should be temporary in nature.

Stock water reservoirs and spring developments should have little long-term adverse impact on environmental quality provided the operational plan in this alternative is adhered to. Initial short-term adverse impacts would result from construction activities and should be minimal. The ultimate long-term result of these improvements could be the establishment of additional habitat for aquatic organisms. Stock water reservoirs may result in a positive impact on riparian zones and aquatic habitat by providing alternate sources of water for cattle.

Depending on the location of trails, they could potentially adversely impact riparian habitat by removal of vegetation. However, depending on the size of the riparian zone, these impacts may be insignificant.

CONCLUSION

Because of the interrelationship between the aquatic and riparian habitat it is expected that any improvements in the aquatic system should be reflected by the riparian habitat as well. The condition of the riparian habitat within the GBRA is expected to improve over the present condition as indicated in the Vegetation portion of this EIS.

It is anticipated that approximately 24.6 miles of aquatic (and riparian) habitat would improve in quality. These miles of aquatic habitat should improve from a poor or fair category to a good condition. Based on information contained in Armour (1973), Hubbard (1977), R.H.S. (1979), Ames (1977), and Davis (1977) concerning the relationship between habitat degradation and fish production (population size) it is expected that this improvement in habitat quality should result in an increase in fish production and the abundance and diversity of aquatic organisms. The exact changes in fish production are not quantifiable at this time because of a lack of data. The improvements in habitat quality should also result in more suitable stream temperatures, less channelization due to increased bank stability, and increased organic input. These increases and improvements are not quantifiable at this time due to an insufficient data base.

Impacts on Livestock Grazing

In the long term all the range users with grazing qualifications on the proposed 69 additional AMP allotments would have higher operating costs arising from increased herding of cattle and maintenance of proposed range facilities. With the adoption of the rest schedule, specific periods of use on all pastures would be designated. In order to follow the sequence of grazing designed into the rest schedule, the range users would have to make more frequent visits to the allotments to gather and move livestock to the next pastures designated for use.

Less intensive management allotments would normally designate only the number of AUMs and period of use. In the long term the range users grazing livestock on these allotments would, at the minimum, move their livestock only twice--once in the spring when livestock are turned out and again in the fall when livestock are returned to wintering base properties.

Several studies have shown advantages to livestock by rotational type grazing systems (Heady 1975; Woolfolk 1960; Rader 1961; Ratliff and Rader 1962); however, other studies showed little advantage to rotational grazing (Driscoll 1967).

The proposed projects and treatments, in the long term, would improve livestock distribution within pastures or allotments. Through improved distribution, subsequent improvement in range and vigor and condition (see Vegetation) would result in improvement in livestock production (Merrill 1954).

Approximately 23,448 AUMs of additional livestock vegetation (with management only; with treatments the increase would be 36,025 AUMs) is expected to become available for use by the year 2005 (includes proportionate livestock share of overlap). For analysis purposes only, this alternative assumes that all potential livestock AUMs would be allocated to livestock. Actual determination of which areas would receive additional livestock use would be determined through the land use plan when the actual increase in vegetation occurred. At the projected rate of vegetation improvement, livestock use could be increased to the present level of active qualifications (60,013 AUMs) by the long term.

A total reduction in active use of 15,444 AUMS on public land would result from reduced grazing on 103 allotments. Two allotments which had use in 1978 (34 AUMs) would have no livestock grazing authorized by 1985 (short term). Therefore, operators may have to obtain forage elsewhere to maintain present herd size.

Fifty allotments would have their turnout dates set back. Therefore in the spring range users would have to purchase additional feed, or lease or buy land to carry their livestock through the additional period of time they are not allowed on public rangeland.

Under this alternative, depending on grazing formula, livestock could be moved from one pasture to several. For example, livestock could be turnedout in one spring pasture, gates could be opened and livestock could be allowed to drift or drive into another pasture. Depending on numbers of pastures, livestock could be found grazing in all pastures as the growing season progresses.

Utilization of key species would impact livestock grazing since the degree of annual herbage removed would be no greater than that shown in the proper use tables (Appendix RM-2). Early spring grazing (before five leaf stage) would be allowed of no more than 60 percent of the growth at that period (30 percent of annual herbage).

CONCLUSION

The MFP Spring Rest Alternative would impact all livestock operators, either through more intensive management, limitations on utilization of key forage species, reduction in grazing qualifications, or change in period of use. A total reduction in authorized use of 15,471 AUMs on public lands is proposed. Those operators with grazing qualifications on areas proposed to receive intensive livestock management through AMPs would be impacted more than those with grazing qualifications on areas proposed for less intensive management.

Impacts on Cultural Resources

The general evidence for the area (Uncompahgre Livestock Grazing EIS--1978) indicates that livestock grazing has only minimal effects on cultural values, except for specific situations. These situations are trampling around springs where mixing of horizontal layers can occur and along stock trails where secondary erosion can occur resulting in the displacement of cultural materials. Another potential impact of livestock grazing is rubbing of standing structures. The detrimental effect of livestock rubbing on standing structures has been documented in the San Luis Livestock Grazing EIS.

All of the other implementing actions could create adverse impacts because they are surface disturbing. These actions include: spring development or improvement; pipelines, water troughs, wells, and reservoirs; trail construction; cattle guards; fences; burning; and mechanical treatments. Surface disturbance on or in the immediate vicinity of cultural sites creates adverse impacts to those values. These impacts have been demonstrated and documented by various studies, such as DeBloois, Green, and Wylie (1974).

The impacts of surface disturbing activities on cultural resources are generally:

1. Disturbances or loss of horizontal cultural deposits;

2. Disturbance or loss of vertical cultural deposits;

3. Disturbance or loss of paleoecological data; and

4. Disturbance or loss of natural stratographic deposition. Surface disturbance, in effect, causes destruction or mixing of artifacts and other data, destroying the evidence of human use and patterns of occupation at a site.

All of the identified impacts could adversely effect open lithic scatters. Rock art panels are not likely to suffer impacts unless construction activities require movement of the rock containing the panel. Surface structures could suffer from cattle rubbing. Rockshelters are unlikely to be affected by this alternative. Trampling is the only conceivable source of impact to rockshelters, and based on the topographic situation of the known rockshelters adverse impact is unlikely.

Although vandalism cannot be directly related to this alternative, it can be considered an indirect impact since construction of facilities and treatments could bring additional people into the area. Vandalism is the single most damaging impact on cultural resources. Unscientific collection and excavation of cultural values are perhaps the greatest obstruction to understanding past use of the area. The destruction of archeological and historic sites through vandalism generally means the total loss of information that might have been recoverable through scientific research. The cultural resource base is finite and the continual loss of information slows the results of studies of past cultures.

The major types of losses that result from vandalism are the loss of diagnostic characteristics that aid in the identification of a cultural site, the loss of temporal data, the loss or mixing of data concerning the adaptations of past peoples to their environment, and the loss of data concerning the affect of past peoples on their environment.

Damage by surface disturbing activities could occur to cultural values that are not discovered during inventory and/or may be subsurface.

Salvage excavations of such sites could partially mitigate the loss of information on sites found during construction. However, salvage archeology is in itself an unavoidable adverse impact. Once excavated, a site is destroyed and removed from future research considerations. The nature of salvage archeology is rarely as effective as other research programs because of the more stringent time limitations, funding constraints, and limited availability of personnel.

Inventory and assessment of prehistoric and historic resources directly affected by this alternative would provide immediate gains in scientific knowledge of the area and provide an expanded data base for long-term gains (Appendix CRM-1).

CONCLUSION

This alternative could result in adverse impacts to cultural resources through disturbance or destruction. Direct impacts on the cultural values would be primarily the result of the proposed range improvements. Grazing itself, specifically trampling, is considered to have minimal impact, except for sites around springs or in areas susceptible to erosion. Livestock rubbing could damage standing structures, particularly historic structures.

Impacts on Visual Resources

Livestock grazing use would not impact visual resources significantly, although some improvement could be seen through improved vegetation condition. Therefore only the rangeland improvements and treatments were analyzed. Each of the proposed rangeland improvements and treatments was analyzed to determine how much they would contrast with the basic elements (form, line, color, and texture) of the existing landscape features (landform, vegetation, and structures) of the characteristic landscape. Table 4-5 displays the results of analyzing potential visual impacts generated by this alternative.

The seven characteristic landscape types featured in Table 4-6, and Map 11 (Support Data) are a basic generalization and grouping of the original 49 found in the Unit Resource Analysis. These characteristic landscapes are distinguished by the variables landform, vegetation, water, and land use, and, in reducing the landscape types to 7, these same variables received heavy consideration. All landscape types not affected by the different alternatives were not included. The detailed, more site-specific characteristics of the land, therefore, were negated in order to adequately emphasize the whole of the EIS area.

Some assumptions were made for the analysis of the visual impacts in the EIS area. Exact locations for all treatments and improvements were not available. Therefore, the impacts were assessed by assuming a worst-case situation in each landscape type for each proposed activity and assuming viewing distance to be .25 to .5 mile. If the analysis of worst-case was found to be within the acceptable limits established for the visual resource management class, it was presumed that all other cases would be within the acceptable limits.

Other assumptions on the project level to be aware of when examining the contrast rating analysis were (1) the fence surrounding the proposed spring developments would be made with wooden posts; (2) all well developments, except where flowing artesian water is found, would have a windmill to pump water to the ground surface; (3) also to accommodate a worst-case effect, it is assumed all

TABLE 4-5

VISUAL CONTRAST RATING SUMMARY

	Landscape Types							Visual Contrast Rating Summary					
								Major Contrasting Element	Feature with Highest Contrast	Impact Level for VRM Class			
Project	1	2	3	4	5	6	7			I	II	III	IV
IMPROVEMENTS													
Cattleguards		X						Form and Line	Vegetation		L	L	L
			X					Form and Line	Vegetation	M	L		L
				X				Color		M	L	L	L
					X			Line	Vegetation	H	H		
						X		Form	Vegetation		L		L
							X	Form and Line	Land		L		
Fences		X						Line	Vegetation		L	L	L
			X					Line	Vegetation	M	L		L
				X				Form	Vegetation	L	L	L	L
					X			Form	Land	H	H		
						X		Form	Vegetation		L		L
							X	Form	Land		L		
Pipelines		X						Line	Vegetation		L	L	L
				X				Form and Color	Vegetation	M	L	L	L
							X	Form	Land		H		
Reservoirs		X						Form	Vegetation		H	H	H
			X					Form	Land and Vegetation	H	H		L
				X				Form	Land	H	H	H	H
					X			Form	Land	H	H		
						X		Form	Vegetation		H		H
							X	Form and Line	Vegetation		H		
Springs		X						Form	Land		H	M	L
			X					Form	Vegetation	H	H		L
				X				Form	Land	H	M	L	L
					X			Form	Land	H	H		
						X		Form	Land		H		L
							X	Form	Land		H		
Stock Tanks		X						Line	Land		H	M	L
			X					Form	Land	H	H		M
				X				Form	Land	H	H	H	M
					X			Form	Land	H	H		
						X		Form	Land		H		M
							X	Form	Land		H		
Trails	X							Line	Vegetation		L		
			X					Form	Vegetation	L	L		L
				X				Form	Land	H	H	L	L
					X			Line	Vegetation	H	H		
						X		Form	Vegetation		M		L
							X	Form	Land		H		
Well with Windmill		X						Form	Land		H	H	H
			X					Form	Land	H	H		H
				X				Line	Land	H	H	H	M
							X	Color	Land		H		

TABLE 4-5

VISUAL CONTRAST RATING SUMMARY
(continued)

Project	Landscape Types 1	2	3	4	5	6	7	Visual Contrast Rating Summary: Major Contrasting Element	Feature with Highest Contrast	Impact Level for VRM Class I	II	III	IV
TREATMENTS													
Burning		X						Form	Vegetation		H	M	L
			X					Form	Vegetation	H	M		L
				X				Form	Vegetation	H	H	H	L
Chaining		X						Form	Vegetation		H	M	L
			X					Form	Vegetation	H	M		L
				X				Form	Vegetation	H	M	L	L
Contour Furrowing		X						Form	Land		H	L	L
			X					Form	Land and Vegetation	H	H		L
				X				Form	Vegetation	H	H	L	L
Plowing and Seeding		X						Form	Vegetation		H	H	L
			X					Form	Vegetation	H	H		L
				X				Form	Vegetation	H	H	M	L
Rolling Chopper		X						Form	Vegetation		H	M	L
			X					Form	Vegetation	H	H		L
				X				Form	Vegetation	H	H	H	L
Root Plowing		X						Form	Vegetation		H	M	L
			X					Form	Vegetation	H	M		L
				X				Form	Vegetation	H	H	L	L
Sagebrush Spraying		X						Form	Vegetation		H	L	L
			X					Form	Vegetation	H	M		L
				X				Form	Vegetation	H	H	L	L

TABLE 4-6

CHARACTERISTIC LANDSCAPE DESCRIPTIONS

Landscape Type	Percent of Total Affected Land	Description
1	.3	Consists of Scenic Quality Rating Units (SQRU) #12, 14, and 15; American Flats/Silverton Unit Resource Analysis (URA). River canyon with pastoral and riparian influences on valley floor; conifer and quakie stands on moderate to steep valley slopes; occasional rock outcrops. Urbanization and recreation development heavy.
2	48.3	Consists of SQRU #2-4; Gunnison Basin URA. Mountain shrub zone of sage, oak, and rabbitbrush. Generally no water features, rolling hills, broad valleys, mesa tops, and lower mountain slopes.
3	4	Consists of SQRU #5; Gunnison Basin URA. Ponderosa Pine Savana on the undulating junction of plains and mountains. Interspersed parks of sagebrush and grass.
4	31.5	Consists of SQRU #6, 7, and 25; Gunnison Basin URA, and #18, 20-22; American Flats/Silverton URA. Mixed conifer slopes of Fir, Pine, Spruce, and Aspen. Rolling hills to mountains with scattered streams.
5	9	Consists of SQRU #8; Gunnison Basin URA, and #1-5; American Flats/Silverton URA. Rolling flats to steep rocky talus slopes with numerous rock outcrops, rock slides and avalanche paths. Vegetation predomininantly alpine tundra. Many turbulent, curvilinear streams and a few small lakes and ponds.
6	5.9	Consists of SQRU #9 and 11; Gunnison Basin URA, and #6, 8, 9, 11, and 16; American Flats/Silverton URA. High mountain-river valleys. Moderate to very steep canyon walls, conifer studded slopes, usually with stream/river in valley bottom.
7	1	Consists of SQRU #10, 12, and 14; Gunnison Basin URA, and #10 and 17; American Flats/Silverton URA. River canyons with steep, often vertical, canyon walls. Rock outcrops frequent.

reservoirs would have the earthen dam oriented towards the viewer.

The approach taken in this visual impact analysis is to recognize that any change to the landscape would constitute a visual impact to some degree. The impact evaluation considers three degrees of impact; high, moderate, and low. These impact evaluation indicators are of a very tentative and general nature, but are as specific as possible at this level of analysis. As different projects are considered and their designs agreed upon, site-specific studies would reveal the additional and necessary factors that would positively determine the appropriate impact level. Thus, in comparison with the table, later site-specific contrast ratings could raise contradictions. This is anticipated and, in several instances, expected. For instance, reservoirs introduce new forms, lines, and colors that contrast greatly with the existing character of most landscapes. These contrasts are reflected in Table 4-5 where reservoir impact levels for all VRM classes are predominantly high. In reality, however, it is felt that most viewers would not be offended by the addition of water and its related impacts on areas where lower VRM classes exist. The summaries of the visual contrast ratings are general, but are still an important indicator for each possible rangeland impact.

According to the VRM Contrast Rating System, Class IV is the most tolerant to visual change. The Visual Contrast Rating Summary concluded that the proposed action in Class IV in most cases, would not create excessive visual contrasts. The impact level for reservoirs ranked high, but on a site-specific analysis could very easily fit into VRM Class IV areas in the majority of instances. Moderate-labeled impacts imply possible acceptable contrasts if adequate mitigation factors on the site specific level are introduced when the individual projects are implemented. The only other high impact in Class IV areas would be on well construction where, on the worst-case basis, a windmill could adversely affect the characteristic landscape of any VRM class. The use of gas and electric-type pumps would lower the contrast rating and in many cases, the characteristic landscape would absorb the impact in Classes II and III. An improvement with high impacts in Class III would be stock tanks, where their form and line contrast with the basic landform of the characteristic landscapes.

VRM Class II, but especially Class I, have a large amount of high impact ratings. By definition the impacts in Class I must be primarily naturally and ecologically oriented. Class II has, by far, the most projects per landscape type of any other VRM class. The tundra landscape type in Class II can absorb little change without high contrasts being created. Pipelines would have a major element-contrast with form on land in landscape type seven. The high impact on spring projects relates more to the surrounding fence than to the spring itself; thus, the form of the fence contrasting with the land would be the most visible impact.

Stock tanks, trails, and wells would also have adverse impacts in this alternative. The contrasting project element receiving the most emphasis would be form as related to the landform.

CONCLUSION

Most visual intrusions due to rangeland projects could be integrated into the landscape through design features. Some short-term impacts could occur during the construction of various projects; however, in the long term, such effects would be masked by the healing of disturbed areas.

Impacts on Recreation

The changes in grazing use could have impacts on the recreational activities of the area, particularly sightseeing, hunting, fishing, and primitive values.

Most recreational activities in the area are enhanced by its scenic quality. As such any impacts to the visual resource would also be recreational impacts. The construction/implementation of numerous range projects and 97,090 acres of land treatments would have an adverse impact during this short-term period. In the long term, after vegetation regrowth, the projects would have minimal adverse impacts (see Visual Resources). The long-term goal of improved vegetation cover throughout the EIS area would enhance the scenic quality and become a beneficial impact.

WILDLIFE

The changes in wildlife numbers, as projected in the Terrestrial Wildlife portion of this section, would have an impact on hunting and viewing opportunities in the EIS area. The DOW regulates hunting activities, so additional wildlife does not automatically mean additional hunting opportunities; however, some correlation between wildlife numbers, hunting and viewing opportunities can be assumed.

The DOW has estimates for the base year of 1977 on the percent of the deer and elk populations harvested and the recreation days per animal harvested (DOW 1977). Using these figures and the population changes indicated in the Terrestrial Wildlife section, changes in recreation days can be estimated. The short term could experience a decrease of 2,805 recreation days due to a decline in elk populations under this alternative. In the long term an additional 5,610 recreation days from elk hunting and 13,640 recreation days from deer hunting could be expected. Wildlife viewing could have a corresponding short-term decrease and long-term increase in opportunities.

FISHING

Fishing use in the EIS area would not be impacted in the short term. The long term would experience a 13 percent improvement in aquatic habitat condition (see Aquatic Wildlife) which could increase fish production and fishing quality. This could provide for an increase in fishing use; however, the extent of this increase is unquantifiable as the correlation between these factors is unknown.

WILDERNESS/PRIMITIVE VALUES

The areas being studied for possible wilderness designation, including the Powderhorn Primitive Area, could be impacted by land treatments and range projects. Under this alternative 3,858 acres of land treatments; 32 springs; 47.8 miles of fence; 6 miles of pipeline; 22 wells; 18 cattle guards; 7 reservoirs; and 35 miles of trails are proposed for allotments which are partially or totally within potential wilderness areas. Those projects which are in that portion of the allotment which is inside the wilderness study area would require an individual evaluation. Should this determination show they would impair the area's wilderness suitability, these projects, under BLM Interim Management Policy for Wilderness Study Areas (*Interim Management Policy and Guidelines for Lands under Wilderness Review*, December 12, 1979), would not be allowed. Generally, those range projects with a high visual impact and most land treatments would not be allowed.

This alternative proposes the elimination of livestock grazing along the East Fork of Powderhorn Creek which is within the Powderhorn Primitive Area and an overall livestock reduction for this area. This would have a short and long-term impact by allowing the area to return to a more natural condition.

CONCLUSION

In the short term, wildlife hunting and viewing opportunities could be reduced due to lowered big game herd sizes. However, by the long term, increased animal populations could lead to increased recreation opportunities. Long-term fishing opportunities could be increased. Impacts to the wilderness potential of suitable areas would be reduced or eliminated through the BLM Interim Management Policy.

Impacts on Economics

The proposed changes in allocation of federal vegetation under this alternative will be analyzed as to their effect on income (range livestock-related, contract construction-related, government-related, and recreation-related), employment, and public finance and tax base.

INCOME

Under this alternative 102 operators would receive a short-term reduction in stocking rates, 2 would have their federal grazing leases eliminated, 19 operators would remain the same, and 2 would have their stocking rate increased.

Table 4-7 shows the number of operators by each model group receiving reductions or elimination of grazing and the resulting effect on gross and net revenues in the short term. To estimate these income changes the proposed level of use was subtracted from the present level to determine changes in use of BLM vegetation. The economic impacts on ranching operations as the result of these reductions in vegetation use were determined by using the CSU study explained in Appendix SE-1.

In total 104 operators would experience some income loss associated with stocking reductions and elimination of vegetation utilization.

Gross revenue would be reduced in the short term by an estimated $1,104,606 from $9,640,100 to $8,535,494 which when applied to the business activities multiplier of 2.12, indicates that sales to other sectors of the EIS area economy would be reduced by $2,341,765. In the long term gross revenue would be increased from the present $9,640,100 to $9,862,740. The total direct and indirect benefit to the EIS area economy would be $472,000.

TABLE 4- 7

RANCH SIZE AND INCOME EFFECTS--MFP/SPRING REST ALTERNATIVE

Model	Number of Ranches	Total BLM AUM Reduction	Average AUM Reduction per Ranch	Annual Gross Revenue Changes per Ranch	Annual Gross Revenue Changes/ All Ranches	Annual Net Revenue Changes per Ranch	Annual Net Revenue Changes/ All Ranches
I	46	2,305	50	$ -2,019	$ -92,874	$ 149	$ 6,854
II	25	3,926	157	-10,380	-259,500	-4,897	-122,425
III	9	1,333	148	-15,479	-139,311	-10,107	-90,963
IV	13	5,442	419	-34,657	-450,541	-6,308	-82,004
VI	6	1,810	302	-24,151	-144,906	374	2,244
VII	2	89	45	-1,429	-2,858	-244	-488
VIII	3	586	195	-46,881	-140,643	-19,768	-59,304
TOTAL CHANGE	104	15,491			$-1,104,606		$-346,086
EXISTING					$ 9,640,100		$-208,430
NET					$ 8,535,494		$-554,516

Source: BLM Range Automated Data System, 1978, for ranch sizing.

Net revenue, which is direct income to the ranching families, would be reduced by $346,086 from a net loss of $208,430 to a net loss of $554,516. Applying the income multiplier of 2.92 to this indicates that an additional $1,064,671 reduction in indirect income would occur in the EIS area. Thus the total direct plus indirect income short-term effect would be an estimated $1,619,187 reduction which is 4.5 percent of the 1976 EIS area personal income. In the long term, $135,095 in direct income would be gained by area families. Net income would change from a loss of $208,430 to a loss of $73,335. Total direct and indirect income increase would be $394,477. Income lost while rangelands are rebuilding would be irretrievable to EIS area ranchers.

Almost all of the grazing use of public lands in the EIS area takes place during the summer. It is during this time that hay is produced on the ranches. The successful operation of most ranches requires haylands be available to produce hay during the summer. Because of this it is extremely difficult to find alternative feed sources to public lands. Sixty-nine of the operators would have to provide over 5 percent of their summer feed requirements from other sources during the time the animals would normally be on public lands. The proposed grazing schedules would help alleviate some of this problem by allowing the operators to choose when grazing on public lands could best benefit their operations.

Changes in economic conditions on affected ranches could cause an undetermineable number of them to go out of business and could also stimulate some consolidation of ranch units. Those ranchers who did go out of business would not benefit from the long-term increases in vegetation allocations.

Land treatment and range improvement projects associated with this alternative have been described in Chapter 2. Because land use planning for the EIS area has not been completed the figures given represent the maximum acres to be treated and projects developed. The following figures are also maximums that would be reached if all projects were completed.

Land treatment and projects would cost an estimated $3,452,900 to implement and construct. If an estimated 20 percent of this total cost is returned as income by EIS area households, the income would be $690,580. This would be spread over the several years that would be required to implement the proposed projects. The actual magnitude and significance of these impacts is dependent upon the number of contractors and the size of the labor force employed from within the EIS area.

Annual expenditures for maintenance would represent an ongoing impact in the area. It is estimated that the annual maintenance cost of these projects would be $84,850. If 30 percent of this were to become personal income, $25,455 would be available to households in the EIS area.

Maintenance costs have both positive and negative aspects. On the positive side, the increased income, although minimal, would be welcome. However, some of the actual annual maintenance would be assumed by ranch operators (e.g., fences and springs) as a condition of AMP implementation.

Thus, it appears that some of the beneficial income impacts to construction workers, ranch hands, etc., would come at the expense of livestock operators.

It is estimated that deer and elk hunting generated $2,841,020 of income in 1977 in the EIS area. Under this alternative numbers of these species would decrease in the short term. Correspondingly, income would be reduced by $96,860 to $2,744,160. In the long term income would increase by $464,630 to $3,305,650.

EMPLOYMENT

Implementation of this alternative would require 268 man months of BLM labor above the amount level of 220 man months in the short term for survey, design, contract supervision, maintenance, and range supervision. In the long term 1,070 man months would be required above the projected 880 man months under the no action alternative.

There would be an estimated decrease of 8.1 man-years of hired labor on EIS area ranches as the result of the reduction in federal vegetation. This would be a short term reduction. As additional forage is made available and allocated to livestock, use of hired labor would increase proportionately. In the long term there would be an increase of 10.8 man-years of hired labor used.

PUBLIC FINANCE AND TAX BASE

As indicated previously there would be a short-term decrease of 17,514 in allowable AUMs from the presently licensed level. This decrease would represent economic value to the 104 ranches involved. Therefore, the relative value of these ranches and of the EIS area tax base would be decreased in the short term.

A survey of area realtors indicates that currently the value of livestock ranches in western Colorado is about $3,000 per animal unit carrying capacity. A decrease of 15,491 AUMs would translate into a short-term decrease of 1,291 animal units which would decrease the rancher wealth of the affected ranches by $3,872,750 from $143,430,000 to $139,557,250. The long-term increase would amount to $797,000 above the current level.

A related decrease would involve the tax base. In Colorado property can be assessed at 30 percent of its market value. In recent years agricultural land has tended to be assessed at a level much below this because of the rapid rise in land prices. If ranch land is assessed at 5 percent of its market value, the decrease in federal vegetation allocations would result in a decrease in assessed value of the affected counties of $193,638, from $46,453,610 to $46,259,972. An estimated $12,976 in property taxes would be lost to the three counties. In the long term assessed value would increase by $39,856 and property tax revenues would increase by $2,672. Losses in tax revenues would be irretrievable.

CONCLUSION

Under this alternative short term gross and net income of EIS area ranchers would decrease, as would income from deer and elk hunting and use of hired labor. Rancher wealth and associated county assessed values and tax revenues would also decrease. Short term income to EIS area residents from range improvements and treatments would increase. In the long term as more vegetation is made available these decreases would change to increase above present levels.

Impacts on Social Conditions

SOCIAL WELL-BEING

In the short term (at the very least), the social well-being of the 159 families associated with the income losses would be adversely impacted. In the long term part of the vegetation and subsequent income loss would be regained as the condition of the rangeland improved. However, since vegetation availability is not expected to reach present levels until 2005, there would be a long-term adverse impact on these ranches.

Some of these 159 families could also be adversely impacted if they were not able to remain in the range livestock business due to inability to sustain the vegetation losses, since the dependency on BLM vegetation of some ranches associated with these families is relatively critical. Some of these individuals could be adversely impacted as a result of the social and occupational dislocation which could result from the inability to survive the vegetation use reductions.

SOCIAL AND CULTURAL ATTITUDES

The BLM vegetation use reductions could conflict with aspirations held by the ranching community, since it would diminish the relative importance of what many in livestock ranching consider to be a justified and important land use. Those directly impacted by reductions could feel themselves deprived of opportunities to pursue what they consider to be a hard-working, independent existence.

Those livestock ranchers without reductions or periodic eliminations in their intensive management allotments could be expected to concur with the alternative, since it would enhance their use of public lands by providing what many of them consider to be needed range improvements.

Short-Term Uses vs. Long-Term Productivity--MFP/Spring Rest Alternative

In the long term, due to total implementation of this alternative, vegetation condition on sagebrush dominated range sites would improve from 14 percent (43,051 acres) to 69 percent (213,577 acres) in good condition; total production would increase from 518 to 735 pounds/acre/year; and cover would increase from 18 to 26 percent basal. Vegetation response on the alpine slopes range site would be minimal, due to the slow recovery rates of alpine areas.

Although short-term increases in erosion rates are expected temporarily on areas proposed for some vegetation treatments (from 929,129 to 1,084,601 tons/year), long-term erosion rates on these areas should decrease (to 569,466 tons/year).

In the short term, average infiltration capacity on vegetation treatments would decrease by 16 percent (1.91 to 1.61 inches/hour), while the average surface runoff volume would increase by 25 percent (0.2510 to 0.3142 acre-feet/sq mi/6 month grazing season). However, by the long term, these trends should be reversed and the infiltration capacity should be increased to 2.52 inches/hour and surface runoff decreased 0.0574 acre-feet/sq mi/6 month grazing season. Corresponding short-term increases and long-term decreases in sediment production would also occur. On areas without vegetation treatments, the short term average infiltration capacity would increase from 1.91 to 2.07 inches/hour, while the average surface runoff volume would decrease from .2510 to .1852 acre-feet/sq mi/6 month grazing season. In the long term, these trends would reverse and approach the present value for infiltration (1.91 inches/hour) and surface runoff (.2510 acre-feet/sq mi/6 month grazing season). Long-term soil compaction rates (which contribute to infiltration and runoff rates) would decrease 8 percent on untreated areas and 32 percent on treated areas.

In the short-term, elk numbers would decrease (8,500 winter; 2,700 summer; 200 yearlong to 8,000 winter; 2,700 summer; 140 yearlong), and mule deer and mountain goat numbers would remain stable. In the short and long term, pronghorn and bighorn sheep numbers would increase (pronghorn short term/long term would be 200/500 yearlong; bighorn sheep short term/long term would be 150/180 winter; 175/210 summer, 100/140 yearlong). In the long term, elk numbers would increase (9,000 winter; 3,300 summer; 210 yearlong), mule deer numbers would increase (22,000 winter; 7,750 summer), and mountain goat numbers would increase (45 winter).

In the long term, approximately 26.6 miles of aquatic habitat would improve from a poor or fair condition to a good condition. These improvements should lead to a corresponding increase in fish production.

In the short term, livestock vegetation allocations in the EIS area would be reduced from 60,013 to 44,542 AUMs. With total implementation of this alternative, 63,201 AUMs of livestock vegetation would be available by the long term. Those operators with intensively managed (AMP) allotments would have increased costs in the short term due to more livestock management (herd moving, checking, etc.) and facility maintenance. These costs would continue in the long term, however, they could be partially offset by increases in allocatable vegetation.

In both the short and long term, cultural resources could be lost through unintentional disturbance or vandalism. Although salvage archeology could have an adverse impact itself, it could add to the area's cultural data base in both the short and long term. Without surveys over proposed project sites, this information might never become available.

Short term visual impacts could occur due to construction of rangeland improvements or treatments. However, in the long term, these disturbances should improve as the vegetation conditions improve.

Decreases in wildlife numbers would cause a short-term decrease of 2,805 recreation days for elk hunting. In the long term, elk hunting recreation days could increase by 5,610 and deer hunting days by 13,640. Wildlife viewing opportunities could have corresponding short-term decreases and long-term increases. In addition, improvements in aquatic conditions could lead to increases in fish production and fishing quality.

Due to vegetation allocation reductions, gross revenue in the EIS area would be reduced from $9,640,100 to $8,535,494 in the short term. In the long term, gross revenue would be increased to $9,862,740. Net revenue would be reduced from a loss of $208,430 to a loss of $554,516 in the short term; however, the long term should see an increase in net revenue to $-73,335.

The income received by EIS area households from construction and implementation of rangeland improvements ($690,580) would be a short-term beneficial impact. Annual maintenance costs returned to EIS area households ($25,455) would be long-term benefits.

Since ranch values are based partially on grazing permits, the reduced allocations would reduce present ranch values by $3,867,750 in the short term. By the long term however; ranch values should have increased from the present value by $797,000. Related short-term decreases would be in the counties' tax base (by $193,638) and property tax revenues (by $12,976). In the long term, the counties' tax base should increase by $39,856, and property tax revenues by $2,672.

Reduced vegetation allocations could impact the social well being of those operators affected in the short term. However, as rangeland conditions improve in the long term, additional vegetation would become available for allocation and the well being of those affected could be improved.

Adverse Impacts--MFP/Spring Rest Alternative

The temporary increases in erosion rates from areas proposed for rangeland treatments would be adverse impacts. Temporary decreases in water infiltration rates and corresponding increases in surface runoff would be adverse impacts.

A short-term reduction in elk numbers would be an adverse impact (500 fewer winter; 60 fewer yearlong).

The reduction of livestock vegetation allocations (by 15,471 AUMs) would be an adverse impact. Increased herd management costs and facility maintenance costs would be adverse impacts.

The loss of cultural resources through unintentional disturbance and vandalism would be an adverse impact.

Temporary land disturbances due to construction of rangeland improvements would be adverse visual impacts.

A decrease of 2,805 recreation days for elk hunting would be an adverse impact.

The short-term losses in gross revenue ($1,104,606) and net revenue ($346,086) would be adverse impacts. Also, the losses in ranch values ($3,867,750), the counties' tax bases ($193,638), and property tax revenues ($12,976) would be adverse impacts.

There could be adverse impacts to the social well being of operators receiving grazing reductions.

Irreversible or Irretrievable Committments--MFP/Spring Rest Alternative

The amount of soil lost through temporarily increased erosion due to vegetation treatments would be an irretrievable committment.

Any cultural resources lost through unintentional disturbance or vandalism would be irretrievable.

The short-term monetary losses in gross and net income, counties' tax base, and property tax revenues would be irretrievable.

FALL REST ALTERNATIVE--IMPACTS

Non-Affected Resources

The impacts of this alternative upon soils, water resources, terrestrial wildlife, cultural resources, visual resources, recreation, and social conditions would not be measurably different from those described under the MFP/Spring Rest Alternative. See that section for a discussion of impacts.

Impacts on Vegetation

The only difference between the MFP/Spring Rest and the Fall Rest alternatives would be due to the characteristics of the rest schedules in the two alternatives, as is indicated by their titles. The long-term impacts on the vegetation caused by the differing rest schedules are discussed in this section.

SAGEBRUSH-DOMINATED RANGE SITES

As mentioned previously, the only difference between the MFP/Spring and Fall Rest alternatives would be due to the modified rest schedule. In general, the magnitude of vegetation response from the existing situation would be greater for the Fall Rest Alternative than for the MFP/Spring Rest Alternative. This would be due to the more effective period of rest. As seen on Table 4-1, production (total lbs/acre/year) would increase from 518 (the existing situation) to 830 by 2005 on the sagebrush-dominated range sites due to the Fall Rest Alternative. This can be compared to the increase in production to 735 under the MFP/Spring Rest Alternative. Cover would increase from 18 (the existing situation) to 28 percent basal, by 2005 under the Fall Rest Alternative (MFP/Spring Rest would be 26). The acres in good condition class would increase from 14 percent (43,051 acres) to 75 percent (232,309 acres; MFP/Spring Rest would be 213,577 acres).

To adequately understand the differences between the MFP/Spring and Fall Rest alternatives, a summary discussion of the MFP/Spring Rest is needed.

The problem with the rest schedule in the MFP/Spring Rest Alternative is that it is constructed around the premise that livestock use in the spring is the most detrimental period of use to grass plants. Periods of spring use are followed in subsequent years by use which begins progressively later in the season, until the rest cycle is completed and starts over. However, proper spring use (use after range readiness and not above carrying capacity of the range) is not as harmful to grass as the same level of use later in the season, at the predormancy period of grasses. Several researchers have suggested that defoliation in the period after seed ripe, and before dormancy, is particularly harmful to grass because this is the period when growth is slow, and the plants are actively restoring their carbohydrate reserves. Defoliation at this period reduces the amount of leaf area able to undergo photosynthesis, and thus severly reduces the plants' capacity to store reserves before fall dormancy. The problems inherent in the rest schedule of the MFP/Spring Rest Alternative are not evident in the Fall Rest Alternative, since as indicated by their titles, the season of rest is reversed.

The fall rest schedule is based on the premise that grazing immediately before the fall dormancy period of grasses is more detrimental to the continued vigor of the plants than grazing at any other period. Summer grazing is the next most detrimental period, followed by spring grazing, and grazing during plant dormancy, which is the least harmful period of use (Trlica, personal communication 1979). In the fall rest schedule, periods of late season use are followed in subsequent years by rest at earlier periods. This is to allow periodic time for regrowth and accumulation of carbohydrate reserves during the grazing cycle. Grazing use may occur each year after the dormancy period of grasses (September 16 or later).

Although the fall rest schedule is new and essentially untested, much research supports the foundations of the schedule--that grazing during the fall predormancy period of grasses is the most detrimental period of use, and that periodically allowing regrowth before dormancy would restore carbohydrate reserves. This research is discussed in Chapter 2--Fall Rest and Appendix RM-9.

The quantified impacts shown in Table 4-1 and discussed above are dependent on three assumptions:

1. Spring livestock use would not occur before range readiness;
2. Livestock use would not be more than 60 percent of the current plant growth on desirable species;
3. Plant regrowth would occur after spring use.

Range readiness is defined as the 4 or 5 leaf stage of perennial grass species (Trlica, personal communication 1979).

It should be pointed out that 60 percent utilization in the spring is less total herbage than 60 percent utilization in summer, because the plant is smaller. Only 60 percent of the current plant growth should be taken. This is an important factor to take into consideration when grazing in the spring. Failure to control utilization to no more than 60 percent of the current plant growth would nullify any positive effects on the vegetation from the rest schedule.

Regrowth will usually occur in plants after spring use, since precipitation (which is the most important factor influencing vegetation production, according to Stoddart et al.--1975), is normally available in the Gunnison Basin in the summer months. At all weather stations in the Gunnison Basin, except Crested Butte, July and August are the months of highest average precipitation. In drought years, however, little regrowth would occur after spring use, and consequently little positive benefit would accrue from the rest schedule. Stoddart (1975) has pointed out that in the West significantly subnormal precipitation (less than 85 percent of the average) occurs in 20 to 40 percent of the years--approximately one year in three.

The general discussion above also applies to grassland/meadow range sites, subalpine loam (American Flats/Silverton), and mountain meadow. A larger magnitude of vegetation response for these range sites is expected as a result of the Fall Rest Alternative, as compared to the MFP/Spring Rest Alternative. Estimated impacts are shown on Table 4-1, for allocation, grazing system, and treatments. The vegetation impacts for mountain meadow sites also apply to riparian zones.

An insignificant and unquantifiable difference in vegetation response between the MFP/Spring and Fall Rest alternatives would occur on alpine vegetation and endangered and threatened plants. The discussion of these vegetation components under MFP/Spring Rest also applies to Fall Rest.

CONCLUSION

The only difference between the MFP/Spring and Fall Rest alternatives would be due to the different types of rest schedules in each alternative. Basically, a larger vegetation response would occur under Fall Rest as opposed to MFP/Spring Rest.

Production would increase from 518 (the existing situation) to 830 pounds/acre/year on sagebrush-dominated range sites, due to the Fall Rest Alternative. (Production at 2005 for MFP/Spring Rest would be 735.) The acres in good condition on sagebrush-dominated range sites would increase from 14 percent (43,051 acres) to 75 percent (232,309 acres) by 2005 (MFP/Spring Rest at 2005 would be 69 percent--213,577 acres).

The larger magnitude of vegetation response for the Fall Rest Alternative (compared to the MFP/Spring Rest Alternative) would be due to the more effective period of rest. Under Fall Rest periods of late season use would be followed in subsequent years by rest at earlier periods, in order to periodically allow time for regrowth and accumulation of carbohydrate reserves during the grazing cycle. Several researchers have found that defoliation at the predormancy period of grasses (after flowering and before dormancy) is the most detrimental period for defoliation. The predormancy period for most grasses is late summer or early fall.

Impacts on Aquatic Wildlife

AQUATIC/RIPARIAN HABITAT

Since this alternative would be a modification of the MFP/Spring Rest Alternative, it will not be discussed in detail exceept where the two alternatives differ in terms of the impacts on aquatic/riparian habitat quality.

The major difference between these two alternatives would be that the fall rest is expected to provide a greater degree of improvement in aquatic/riparian habitat quality based on changes in the vegetation portion of the aquatic/riparian ecosystem. Specifically, the changes in habitat quality should result in approximately 34 additional miles of good aquatic habitat (see Table 4-4). This quality increase over the present situation would primarily be a result of decreases in the miles of habitat in poor and fair condition. This anticipated improvement in stream habitat quality should also reflect a coinciding change in riparian habitat quality.

Refer to MFP/Spring Rest--Aquatic Wildlife for a discussion on the impacts of treatments and improvements under this alternative.

CONCLUSION

Under this alternative, it is expected that there would be an overall net improvement in the aquatic/riparian habitat from the present situation, and there would be a 34 percent increase in the number of stream miles in good condition over the present situation (Table 4-4). This would be an estimated increase of 10 additional miles over the MFP/Spring Rest Alternative. It is expected that this improvement should be reflected by some subsequent increases in fish production since according to Armour (1973), Ames (1977), Hubbard (1977), R.H.S. (1979), and Davis (1977) habitat degradation (quality) and fish population size are directly related. However, the anticipated increase in aquatic organism populations is not quantifiable at this time due to an insufficient data base to draw from.

The anticipated improvements in aquatic habitat quality and riparian habitat quality should provide more suitable stream temperatures along with increased bank stability and greater organic input. However, the degree of influence these parameters would have is unquantifiable at this time due to the insufficient data base.

Impacts on Livestock Grazing

This alternative would impact livestock grazing in the same manner as the spring rest alternative with the exception of the rest schedule. The difference would be in the manner livestock were rotated within the grazing system. For example, under the Fall Rest Alternative livestock would be turned out in three of four pastures in the spring and allowed to drift or be driven into the fourth pasture. By the end of the grazing period, livestock would be in one pasture while three pastures would be rested.

As compared to the MFP/Spring Rest Alternative, the impact to range users under this alternative would be less. Livestock operators would move livestock into three pastures instead of one. Small calves would be handled less often and trailed shorter distances. As compared to the present situation, livestock would have to be handled more often, possibly up to three times as often. All other impacts would remain the same as the MFP/Spring Rest Alternative.

CONCLUSION

This alternative would impact livestock grazing in the same manner as the Spring Rest Alternative. Livestock turnout would be permitted in three pastures instead of one.

Impacts on Economics

Short-term impacts under this alternative would be essentially the same as under the spring rest alternative since AUM allocations would be the same. There may be some increases on rancher operating costs; however, these are undeterminable at this time.

INCOME

In the long run more AUMs would be made available under this management scheme than under spring rest. Gross rancher income would increase in the long term to $10,478,173. Because of the multiplier effect total income on the EIS area would increase by $1,776,715. Net income to EIS area ranchers would increase in the long term by $426,497 from a loss of $208,430 to a gain of $218,067. Total personal income on the EIS area would increase by $1,245,371.

EMPLOYMENT

Implementation of this alternative would require 268 man months of BLM labor above the current level of 220 man months in the short term for survey, design, contract supervision, maintenance, and range supervision. In the long term 1,070 man months would be required above the projected 880 man months under the no action alternative.

Employment of hired labor would increase in the EIS area by 12.5 man-years as more AUMs are made available to livestock producers.

PUBLIC FINANCE AND TAX BASE

The long-term value of the ranches as well as the assessed value and tax revenues of the EIS area counties would also be affected by this alternative. The capital value of the affected ranches would increase by $2,838,000 from $143,430,000 to $147,268,000. Using the same assumptions as under the Spring Rest Alternative the assessed value of the three affected counties would increase by $141,900 from $46,453,610 to $46,595,510 and property tax revenues would increase by $9,514 from $3,114,583 to $3,124,097.

CONCLUSION

Under this alternative short term gross and net income of EIS area ranchers would decrease, as would income from deer and elk hunting and use of hired labor. Rancher wealth and associated county assessed values and tax revenues would also decrease. Short term income to EIS area residents from range improvements and treatments would increase. In the long term, as more vegetation is made available, these decreases would change in increases above present levels.

Impacts on Social Conditions

Impacts to social conditions would be the same for this alternative as those discussed under the Spring Rest Alternative. Because more AUMs would be made available and implementation would be easier in the long run this alternative may be viewed more favorably by EIS area ranchers.

Short-Term Uses vs. Long Term Productivity--Fall Rest Alternative

In most instances, the short-term and long-term effects of this alternative would be similar to those described under the MFP/Spring Rest Alternative; differences would be slight.

In the long term, vegetation condition on most range sites would improve from 14 percent (43,051 acres) to 75 percent (232,309 acres) in good condition; total production would increase from 518 to 830 pounds/acre/year; and cover would increase from 18 to 28 percent basal.

In the long term, approximately 34 miles of aquatic habitat would improve from a poor or fair condition to a good condition.

In the short term, livestock vegetation allocations in the EIS area would be reduced from 60,013 to 44,542 AUMs. With total implementation of this alternative, 71,370 AUMs of livestock vegetation would be available by the long term.

Adverse Impacts--Fall Rest Alternative

In most instances, the adverse impacts of this alternative would be similar to those described under the MFP/Spring Rest Alternative; differences would be slight.

Irreversible or Irretrievable Committments--Fall Rest Alternative

The irreversible or irretrievable aspects of this alternative would be similar to those described under the MFP/Spring Rest Alternative.

NO ACTION ALTERNATIVE--IMPACTS

Non-Affected Resources

Under this alternative, impacts to cultural resources and visual resources would remain unchanged from the present conditions described in Chapter 3.

Impacts on Vegetation

INTRODUCTION

Under the No Action Alternative, the present level of livestock use (60,013 AUMs) and big game use (36,141 AUMs) would continue. No vegetation treatments would be done.

The long term vegetation impacts (by 2005) under the No Action Alternative are shown by range site in Appendix V-1, and summarized in Tables 4-1.

SAGEBRUSH-DOMINATED RANGE SITES

Under no action, most components of the rangeland vegetation are expected to worsen by 2005. As shown in Table 4-1, production would go from 518 (the existing situation) to 467 (total pounds per acre per year). Cover would decrease from 18 to 17 (percent basal) by 2005. Condition would decrease from 14 percent (43,051 acres) in good condition to 4 percent (10,555 acres) in good condition. The 14 percent would drop into the fair or poor condition classes.

The species composition of sagebrush is expected to increase from 39 to 47 percent by 2005. This is supported by Cooper (1953), and Frischknecht (1978), who found that sagebrush increases in density with greater intensities of livestock grazing. Grass plants are expected to show a corresponding decrease in species composition, from 29 (existing) to 24 percent, at 2005. The decrease would be due to relatively high utilization by livestock, and competition from big sagebrush. Robertson (1947) found that mature sagebrush plants dominate the area within a radius of approximately one meter, suppressing understory herbaceous plants in that area.

The general worsening of the vegetation situation shown above, by 2005, would be due to continuation of the same stocking rates occurring at present, and no proposed vegetation treatments. These stocking rates have resulted in 86 percent of the range presently being in poor or fair condition.

GRASSLAND/MEADOW RANGE SITES

Under the No Action Alternative, the grassland/meadow range sites would also show a general decrease in the components of the vegetation resource. Table 4-1 shows the expected production, cover, species composition, condition, and trend of the vegetation by 2005, on the subalpine loam (American Flats/Silverton) and mountain meadow range sites.

The subalpine loam range site would decrease from an existing production of 731 to 700 pounds/acre/year by 2005. Cover would decrease from 18 to 16 percent basal. Condition would decrease from 1 percent (61 acres) in good and 59 percent (3,993 acres) in fair condition, to 0 in good and 40 percent (2,686 acres) in fair condition by 2005. The remaining 60 percent (4,030 acres) would drop into the poor condition class.

The mountain meadow range site is naturally subirrigated, usually occurring in valley bottoms where the water table is near the surface. The impacts to the mountain meadow site will be discussed in the riparian section.

ALPINE SLOPES RANGE SITE

As discussed under the MFP/Spring Rest Alternative, vegetation change in alpine areas is extremely slow, and an insignificant (unquantifiable) vegetation response is expected to occur in most areas of the alpine zone by 2005. Exceptions are wet meadows and the lower portions (11,000-11,500 feet) of the alpine zone. These areas would exhibit responses similiar to those shown for the subalpine loam (American Flats/Silverton) and mountain meadow range sites.

RIPARIAN ZONE

As previously discussed, the impacts shown for the mountain meadow range site reflect those that are expected to occur in the riparian zone. Production (average total pounds per acre per year) would decrease from 1,495 (the existing situation) to 1,300 by 2005 under the No-Action Alternative. Cover would decrease from 50 to 43 percent basal, while the acres in poor condition would increase from 34 percent (1,253 acres) to 55 percent (2,020 acres).

ENDANGERED AND THREATENED PLANTS

An insignificant (and unquantifiable) difference in vegetation impacts is expected to occur on endangered and threatened plants under the No-Action Alternative as opposed to the MFP/Spring Rest Alternative.

CONCLUSION

On sagebrush-dominated range sites, a general worsening of the vegetation situation would occur by 2005. Production would decrease from 518 to 467 pounds/acre/year. The acres in good condition would decrease from 14 percent (43,051 acres) to 0. Acres in poor condition would increase from 39 percent (119,660 acres) to 60 percent (184,650 acres).

For grassland/meadow sites, a decrease in the vegetation situation would also occur. Production on the subalpine loam (American Flats/Silverton) range site would decrease from 731 to 700 pounds/acre/year. The acres in poor condition would increase from 40 percent (2,662 acres) to 60 percent (4,030 acres).

The vegetation impacts in the mountain meadow range site reflect the expected impacts in the riparian zone. Production in mountain meadows would decrease from 1,495 to 1,300 pounds/acre/year by 2005. The acres in the poor condition class would increase from 34 percent (1,253 acres) to 55 percent (2,020 acres) by 2005.

The above impacts would be due largely to the allocation levels proposed under the No-Action Alternative. Only 10 percent of the anticipated impacts would result from grazing systems, with the rest from allocation. Under the No-Action Alternative, the livestock and big game use would remain at their present levels (60,013 AUMs for livestock and 36,141 AUMs for big game). No vegetation treatments are proposed.

Impacts on Soils

Short and long term sheet and rill erosion rates are expected to remain essentially unchanged from the present rate in most of the Gunnison Basin (Appendix S-2) and the EIS area as a whole. The areas that are heavily grazed would sustain or slightly increase their present high erosion rates, while the areas that are moderately or lightly grazed would have slightly reduced erosion rates. Erosion rates would remain unchanged on eleven allotments that would continue their unallotted status. Riparian zones, mountain swales, and other areas where livestock use continues to be concentrated would still be subject to accelerated erosion. Wind erosion is also anticipated to remain unchanged in the EIS area. Trailing scars would remain unhealed and may increase in numbers, especially in alpine regions. Soil compaction would not be appreciably changed in the EIS area due to continued poor animal distribution and early spring grazing.

No sagebrush control treatments are planned under this alternative, so the present abnormally dense stands of this shrub, with a sparse protective understory, would continue to contribute to accelerated erosion. This is especially detrimental in mountain swales. These sites receive surface runoff and sediments from surrounding land and normally accumulate these sediments on site. When the understory vegetation and litter are depleted, gullying occurs and the sediments are washed through to the stream channels, rather than accumulating in the swales. Also, less moisture is available for plant growth. The net result would be reduced soil productivity.

No rangeland improvements are planned under this alternative, so the present concentrated livestock use in desirable areas would continue and the present level of soil erosion rates and compaction would still occur.

CONCLUSION

A summary of the impacts indicates that short and long-term erosion rates and compaction are anticipated to remain essentially unchanged from the present rate. Short-term erosion on the rangeland in the Gunnison Basin portion of the EIS area would be approximately 929,129 tons/years and long-term erosion would be approximately 959,101 tons/year.

Impacts on Water Resources

WATER QUALITY

Water quality would remain essentially unchanged from the present situation.

WATER QUANTITY

Infiltration and Runoff

In the long-term, the combined effects of continued early spring grazing, an over obligation of grazing privileges, and no land treatments would affect the infiltration capacity, and the volume of surface runoff. Infiltration capacity would be reduced from approximately 1.91 to 1.90 inches/hour, which would increase the volume of surface runoff from 0.2510 to 0.2523 acre-feet/sq mi/6 month grazing season. Short-term impacts would be essentially unchanged from the present situation.

CONCLUSION

In the short-term, the total sediment production and the volume of surface runoff are not expected to change from the present situation.

In the long-term, the total sediment production would not significantly change from the present situation, but the total volume of surface runoff for a 6 month annual grazing season would increase for 117 to 118 acre-feet.

Impacts on Terrestrial Wildlife

Under this alternative, the overall condition of the range sites in the EIS area would decrease. The change would generally be an increase in sagebrush, a decrease in grass and forbs, a decrease in production, and no change in ground cover. However, habitat quality in the various habitat types would not change significantly for most of the animal species. No vegetation treatments or animal reductions would be used to improve the condition; therefore, some species (e.g., elk, deer, bighorns, and grouse), which compete directly with livestock for vegetation and space, and mountain lions, which depend on the larger ungulates as prey, would suffer as their habitat quality continued to decline.

The decline in the condition of the riparian, sagebrush, and mountain shrub types in the EIS area would adversely impact elk, deer, bighorns, lions, grouse, waterfowl, and passerines in the short term and continue on to the long term (Table 4-3). There would probably be no significant change in habitat quality for most of the species from implementation of the alternative in the long term.

THREATENED AND ENDANGERED SPECIES

Even in the long term, this alternative would not appreciably alter the condition of the habitat for the black-footed ferret (prairie dog habitat).

However, the quality of the habitat of both the peregrine falcon and the bald eagle would decline in the riparian type as habitat for passerine birds and waterfowl would continue to decline in the long term. Bald eagles could also be expected to suffer from a continued declining condition of cottonwood stands in these riparian areas due to overuse of young trees by livestock in the spring.

CONCLUSION

Overall habitat quality would decline under this alternative; therefore, the populations of some species would be expected to decline.

Impacts on Aquatic Wildlife

AQUATIC/RIPARIAN HABITAT

Under this alternative, it is anticipated that there would be a net decrease in aquatic/riparian habitat quality over the long term. The ultimate result of this alternative is expected to be a decrease in the amount of good to excellent stream habitat by approximately 56 miles.

CONCLUSION

It is expected that under this alternative, there could be a net decrease of about 30 percent of the total stream miles in the quality of the aquatic habitat (see Table 4-4). This appears to be a reflection of changes in riparian as well as aquatic habitat quality. There should also be a reduction in fish production in terms of pounds/acre.

These decreases in habitat quality would also be expected to have subsequent adverse impacts on stream temperatures, bank stability, and organic input.

Impacts on Livestock Grazing

Under this alternative, impacts to range users would remain unchanged. The present level of 60,013 AUMs of active preference for all allotments would remain the same. Without the rest schedules, specific periods of use would not be implemented. Livestock would continue to be turned out on public land early in period of use.

The 69 allotments scheduled to have AMPs and intensive grazing schedules would remain as less intensive allotments. The remaining allotments would also continue under present livestock grazing practices and pressures. Areas presently receiving heavy grazing use would continue to deteriorate. Poor livestock distribution would continue to result in underutilization of areas presently receiving limited use due to insufficient water sources and livestock management facilities. No significant improvment in livestock grazing conditions is expect to occur.

Although qualifications would remain at the present level, the overall stocking level would decline. A 5 percent deterioration in livestock grazing conditions is expected to occur (a loss of 5,909 AUMS), along with a 5 percent decline in livestock production. The continued good quality of cattle and sheep would remain unchanged. This would be the long-term, minor adverse impact on livestock grazing.

CONCLUSION

Continued early spring turnout of livestock is expected. Areas presently having distribution problems would remain unchanged. Over obligation of the vegetation resource is expected to continue.

Impacts on Recreation

Most recreational activities in the EIS area are enhanced by the scenic quality of the region; as such any impacts to the visual resource would also be recreational impacts (see Visual Resources). Under this alternative no rangeland projects or land treatments would be constructed; thus, related impacts would not occur. In the long term, after vegetation regrowth, the projects would have a minimal adverse impact. The long term would see a general decline in the vegetation condition of the rangeland which would be an adverse impact.

WILDLIFE

The wildlife populations would not change in the short term and thus would have no impact on hunting and viewing opportunities. The long term would experience a drop in elk and deer populations (see Terrestrial Wildlife) which could reduce elk hunting recreation days by 9,537 and deer hunting recreation days by 7,040. A corresponding decline in viewing opportunties could also be expected.

FISHING

Fishing use in the EIS area would not be impacted in the short term. The long term would experience a 30 percent decrease in the aquatic habitat condition (see Aquatic Wildlife) which should decrease fish production and fishing quality. This should somewhat decrease fishing use; however, the extent of the decrease is unquantifiable as the correlation between these factors is unknown.

WILDERNESS/PRIMITIVE VALUES

The continuation of existing grazing practices within the Powderhorn Primitive Area would continue the decline in the area's vegetation condition, particularly in Monument Park and along the East Fork of Powderhorn Creek, which would be both a short and long-term adverse impact.

Impacts on Economics

INCOME

Under this alternative grazing use of public lands would continue essentially as it is at the present. One hundred twenty operators would use public vegetation with no anticipated changes in use level. In both the short and long term gross and net income of these ranches would remain at $9,640,100, and a loss of $208,430 respectively. Indirect income that results from the multiplier effect would amount to another $10,796,800 in the local economy.

In the short term income in the EIS area from deer and elk hunting would remain the same as at present. In the long term hunting-related income to EIS area residents would decrease by $572,400 from $2,841,020 to $2,268,620.

EMPLOYMENT

Ranches with BLM grazing privileges would use 173.05 man years of hired labor. Since there would be no decrease in livestock numbers or in ranch value there would be no changes in the tax base of the counties.

Impacts on Social Conditions

Persons now involved in ranching because of personal preference would remain in ranching. Federal actions would not change their income levels or well-being. The strong attachment the people feel for the land would remain.

Short Term Uses vs. Long Term Productivity--No Action Alternative

In the long-term, vegetation is expected to decline under this alternative. Vegetation condition would decrease from 14 percent (43,051 acres) to 4 percent (10,555 acres) in good condition; total production would decrease from 518 to 467 pounds/acre/year; and cover would decrease from 18 to 17 percent basal.

Short and long term erosion rates would remain at their present levels. Infiltration capacity would decrease slightly, and runoff would increase slightly.

In the long term, elk numbers would decrease (6,800 winter; 2,200 summer; 160 yearlong), mule deer would decrease (12,600 winter; 4,100 summer), pronghorn would increase (300 yearlong), bighorn sheep would increase (140 winter; 160 summer; 100 yearlong), and mountain goats would increase (30 winter).

Approximately 56 miles of good to excellent stream habitat would decline in the long term.

In the short and long term, livestock vegetation allocations would remain the same (60,013 AUMs).

Due to decreases in animal numbers, long-term recreation days for big game hunting would be reduced by 16,577.

Adverse Impacts--No Action Alternative

The long term declines in vegetation condition and production would be adverse impacts.

The losses in elk numbers (1,700 winter; 500 summer; 40 yearlong) and mule deer numbers (3,200 winter; 1,000 summer) would be adverse impacts.

Losses in the quality of aquatic habitat would be adverse impacts.

The loss of elk hunting recreation days would be an adverse impact.

A 5 percent decline in livestock production is expected by 5,909 AUMs.

ELIMINATION OF LIVESTOCK GRAZING ALTERNATIVE--IMPACTS

Impacts on Vegetation

INTRODUCTION

Under the elimination alternative, no livestock grazing would occur on public lands in the EIS area. Initial big game use on public land would be increased from the present level of 36,141 AUMs to 57,997 AUMs.

The vegetation impacts resulting from the elimination alternative are shown by range site in Appendix V-1, and summarized in Table 4-1.

SAGEBRUSH-DOMINATED RANGE SITES

The elimination of livestock grazing and the treatments proposed are expected to result in an increase in all components of the vegetation situation, as seen on Table 4-1. In the sagebrush-dominated range sites production (average total pounds/acre/year) is expected to increase from 518 (the existing situation) to 865 by 2005. Cover would increase from 18 to 32 percent basal. Condition would increase from 0 acres in excellent and 14 percent (43,051 acres) in good to 82 percent (250,515 acres) in good and 15 percent (47,756 acres) in excellent.

The vegetation response would be largely due to the elimination of livestock grazing in the EIS area. However, increases in numbers of big game would also affect the vegetation response. The bulk of big game use of sagebrush-dominated range sites would be in winter. Increased big game numbers would result in significant reductions in browse on the sagebrush-dominated range sites. This is shown in Table 4-1, as species composition of sagebrush would decrease from 39 percent (the existing situation) to 21 percent by 2005. The species composition of grass in the EIS area would increase from 29 to 59 percent by 2005. The increase in grass would be due to a decrease in competition from sagebrush and non-use on grass during most of the growing season at lower elevations. Big game would be at higher elevation summer ranges generally from June to November, depending on yearly weather conditions.

Localized areas in the sagebrush-dominated range sites would show a greater decrease in the species composition of sagebrush than shown on Table 4-1, and also less of an increase in grass than is shown. These localized areas are steep, south-facing slopes in the sagebrush zone, that are free from snow during most winters. Browse on these sites receives excessive use during winter, and dormant grass plants may be chewed off below the soil surface (Nagle and Harris 1966). Trampling in recently thawed, soft soil may kill some herbaceous perennial plants (Nagle and Harris 1966).

GRASSLAND/MEADOW RANGE SITES

The vegetation impacts on grassland meadow range sites are shown on Table 4-1. The subalpine loam (American Flats/Silverton) site would show an increase in production from 731 (the existing situation) to 1,900 total pounds/acre/year by 2005. Cover (percent basal) would increase from 18 to 45. Condition would improve from 1 percent (61 acres) in good condition and 0 acres in excellent to 80 percent (5,373 acres) in good condition, and 20 percent (1,343 acres) in excellent, by 2005. The species composition of forbs would decrease from 40 to 20 percent, while the species composition of grasses would increase from 50 to 70 percent, by 2005.

Big game, particularly elk, would utilize the subalpine loam site during the growing season, since it is part of their summer range. However, the use is not expected to result in the same utilization rate on desirable grasses as if cattle were occupying the range, largely due to the tendency for big game to utilize more forbs and browse during summer than cattle, and the fact that big game use more vegetation in timbered areas during summer than cattle (Mackie 1970; Jones 1965).

ALPINE SLOPES

Alpine areas are expected to show an insignificant (and unquantifiable) vegetation response by 2005, due to the very slow rate of vegetation change in alpine areas. Willard and Marr (1971) have suggested that it may take anywhere from several hundred to a 1,000 years for a climax (Kobresia-dominated) alpine plant community on windswept ridges to naturally recover following disturbance. Certain portions of the alpine, however, may show a quicker response than the rest of the alpine zone; most notably the lower portion of the zone (near timberline, 11,000-11,500 feet) and wet meadows. The vegetation impacts shown on Table 4-1 for mountain meadow and subalpine loam (American Flats/Silverton) reflect the general expected response of these portions of the alpine zone.

RIPARIAN ZONE

The impacts shown for the mountain meadow range site (Table 4-1) are indicative of those for riparian zone, since the two areas correspond both being supported by natural subirrigation.

Production in the mountain meadow site would increase from 1,495 (the existing situation) to 2,300 pounds/acre/year by 2005, due to elimination of livestock grazing. Cover would increase from 50 to 60 percent basal by 2005. condition would improve from 11 percent of the acreage in good condition (398 acres) and 0 acres in excellent condition to 60 percent (2,203 acres) in good condition and 40 percent (1,469 acres) in excellent condition. No vegetation treatments are proposed for the mountain meadow range site.

Wildlife are not expected to congregate in riparian zones as livestock do (Nagle and Harris 1966; Mackie 1970), except during severe winters in the lower elevation big game winter range areas. During harsh winters big game would overutilize shrubs (mostly willows) within the riparian zone in the winter range. Low shrubs may be killed and tall shrubs stripped of leaves and branches as high as the animals can reach, destroying the potential for future growth of succulent material below the "browse line" (Nagle and Harris 1966). A similar impact likely would occur on timbered areas bordering the winter range. The lower bark of trees (such as aspen) may be eaten, girdling and killing the trees. The lower branches of evergreens within reach of big game may also be severely utilized during harsh winters.

ENDANGERED AND THREATENED PLANTS

Elimination of livestock grazing may have an unquantifiable adverse impact on *Astragalus microcymbus*, a forb which is only known from the Gunnison Basin. The habitat types of the known locations of *A. microcymbus* seem to indicate that the plant is an increaser in the presence of grazing. However, *A. microcymbus* would not likely not become extinct if livestock grazing were eliminated in the Gunnison Basin. One of the two known populations of *A. microcymbus* is partially on a steep, south-facing slope which receives heavy winter and early spring big game utilization.

CONCLUSION

Under the elimination alternative, a general increase in the vegetation components would occur by 2005, due to allocations, vegetation treatments, and grazing systems. Production would increase from 518 to 865 pounds/acre/year in sagebrush-dominated range sites by 2005. Cover would go from 18 to 32 percent basal. The acres in good condition would improve from 14 percent (43,051 acres) to 82 percent (250,515 acres). Acres in the excellent condition class would go from 0 to 15 percent (47,756 acres) by 2005.

The improvement in the vegetation situation shown would largely result from the elimination of livestock. However, the increase in big game numbers in the EIS area would also be partially responsible, mainly from the increased utilization of sagebrush in big game winter range.

Grassland meadow and mountain meadow range sites would show an improvement in the vegetation situation similar to that shown for sagebrush-dominated range sites from allocation and grazing systems. In the subalpine loam (American Flats/Silverton) range site, production would increase from 731 to 1,900 pounds/acre/year by 2005. Cover would increase from 18 to 45 percent basal while the acres in good and excellent condition would increase from 1 percent (61 acres) to 100 percent (6,716 acres) by 2005. In the mountain meadow range site production would increase from 1,495 to 2,300 pounds/acre/year by 2005. Cover would go from 50 to 66 percent basal, and the acres in good and excellent condition would increase from 11 percent (398 acres) to 100 percent (3,672 acres) by 2005. The impacts for the mountain meadow range site also reflect those expected in the riparian zone.

During severe winters, localized areas in the big game wintering zone may receive excessive and damaging utilization from big game use. These areas are steep, south-facing slopes which are free from snow in the winter (or where snow melts off early in the spring), riparian zones, and conifer or aspen forests bordering winter range.

The majority of alpine areas are not expected to show a significant (quantifiable) change due to the elimination of livestock grazing, primarily from the slow rate of change following disturbance in the alpine.

Astragalus microcymbus, a forb which is known only from the Gunnison Basin, may be harmed an unquantifiable amount from the elimination of livestock grazing in the sagebrush-dominated range sites. *Asgragalus microcymbus* appears to be an increaser plant in response to livestock grazing. The plant would not be expected to become extinct as a result of elimination, however.

Impacts on Soils

Long-term sheet and rill erosion rates in the Gunnison Basin portion of the EIS area are anticipated to decrease an average of approximately 66 percent compared to the present erosion rate as a result of the elimination of livestock grazing (Appendix S-2). There would be no measurable change in erosion rates for the eleven allotments in the EIS area that were previously not grazed by livestock. Short-term erosion rates would not change on the untreated areas.

Vegetation treatments on up to 34,824 acres could reduce erosion approximately 77 percent from the present rate to near natural erosion rates on the treated areas based on predicted increases in vegetation cover. A high sagebrush kill ratio, reseeding where needed, and retreatment where necessary are assumed in computing the reduction. The short-term erosion rates after vegetation treatments would increase approximately 58 percent to 4.9 tons/acre/year on the treated acreages. The short-term erosional impacts of each method are described in the MFP/Spring Rest Alternative impacts discussion.

Riparian areas are expected to exhibit reduced erosion rates and return to a stable condition (0.02 tons/acre/year sheet and rill erosion).

Soil compaction would decrease approximately 31 percent where no vegetation treatments were implemented and 44 percent on treated areas.

Construction of 1,000 miles of fence would result in negligible erosion rate changes for the EIS area.

With the data available, erosion rates for the American Flats/Silverton portion of the EIS area are not quantifiable at the present time. The general effect of this alternative however, would be a modest decrease in erosion rates in the alpine areas and some healing of trailing scars. No new physical soil damage by livestock would occur. The lowered infiltration rates due to soil compaction by livestock would be largely recovered. The subalpine areas would show a considerable decrease in erosion and soil compaction roughly proportional to the increase in basal cover of vegetation.

Wind erosion would be anticipated to decrease a slight but unquantifiable amount under this alternative in the EIS area.

CONCLUSION

Long-term soil erosion rates and compaction are anticipated to decrease approximately 66 percent (from 3.1 to 1.1 tons/acre/year) and 31 percent, respectively, as a result of the elimination of livestock grazing. Vegetation treatment areas would exhibit approximately a 77 percent long-term decrease in erosion (from 3.1 to 0.7 tons/acre/year) and 44 percent decrease in soil compaction. Short-term erosion on rangeland in the Gunnison Basin portion of the EIS area would increase to approximately 991,812 tons/year. Long-term erosion would decrease from the present rate of approximately 929,129 tons/year to approximately 299,719 tons/year.

Impacts on Water Resources

WATER QUALITY

On the areas proposed for vegetation treatments, the long-term sediment production would decrease by 67 percent. However, the short-term sediment production would increase 15 to 56 percent depending upon: type of stream (perennial, etc.), amount of annual precipitation, soil type, land slope, vegetation density, type of treatment, and weather conditions at the time of treatment.

Resulting from the elimination of livestock grazing , on lands not scheduled for land treatments, the long-term sediment production would be reduced by 66 percent. In the short-term, the sediment production would essentially remain the same as the present condition.

See Appendix W-1 and Water Resources, Introduction to Impacts for a discussion on sediment quantification. For a more detailed discussion on impacts resulting from vegetation manipulations see impacts of the MFP/Spring Rest Alternative.

WATER QUANTITY

Infiltration and Runoff

In the short term, the average infiltration capacity (weighted average based on number of acres proposed for each major type of vegetatation manipulation), combining all vegetation treatments is estimated to decrease by 17 percent (from 1.91 to 1.58 inches/hour) while the average volume of surface runoff is expected to increase by 28 percent (from 0.2510 to 0.3211 acre-feet/sq mi/6 month grazing season).

In the long-term, on areas proposed for land treatment, the average infiltration capacity would experience an increase of 40 percent (from 1.90 to 2.75 inches/hour) while the volume of surface runoff would decrease by 82 percent (from 0.0902 to 0.0162 acre-feet/sq mi/6 month grazing season).

On lands not scheduled for land treatments, the elimination of livestock grazing would not create any significant change, from the present, in the short term infiltration capacity and surface runoff volume. However, the long-term average infiltration capacity would increase by 33 percent (from 1.91 to 2.52 inches/hour) and the surface runoff would decrease by 63 percent from 0.2510 to 0.0926 acre-feet/sq mi/6 month grazing season for untreated areas.

CONCLUSION

In the short term, the total sediment production is expected to increase between 2 and 7 percent while the total volume of surface runoff for a 6 month annual grazing season would increase from 117 to 121 acre-feet.

In the long term, the total sediment production would be reduced by 66 percent while the total volume of surface runoff for a 6 month annual grazing season would decrease from 117 to 12 acre-feet.

Impacts on Terrestrial Wildlife

To implement this alternative, a substantial increase in the amount of fencing required to prevent livestock from grazing on the public lands in the EIS area could have an adverse impact on big game movement, especially in deep snow.

There would also be an adverse impact to the Utah tiger salamander, due to the probable slow weathering and subsequent disappearance of small, earthen water impoundments in the EIS area. Livestock watering ponds are the only habitat in the area where these salamanders have been observed. If maintenance for livestock watering were not kept up on them, this habitat would decline.

Table 4-1 shows that the range sites would improve dramatically with the elimination of livestock grazing. The habitat types would likewise improve, and virtually all wildlife species would benefit (see Tables 4-2 and 4-3) in the short term and in the long term as the condition of the plant communities progressed from their present state toward excellent condition.

The improvement in quality of riparian habitat, both short and long term, would be especially important. This type is used by more animal species than any other type. In a study performed in the EIS area comparing riparian communities under no grazing, deferred-rotation grazing, and annual spring and fall grazing treatments, Rucks (1978) found that species diversity and total numbers of birds and mammals decreased with increased grazing pressure. The ungrazed site consistently displayed the highest number of birds per transect, and some mammal species which were present in the ungrazed site were not present in the grazed sites (Rucks 1978).

THREATENED AND ENDANGERED SPECIES

Habitat quantity and quality would probably substantially improve for these species through improvements in prey animal habitat as well as their own.

CONCLUSION

Habitat would improve and populations would increase for almost all wildlife species under this alternative. The exception would be the Utah tiger salamander, which depends upon earthen stockponds for habitat.

Impacts on Aquatic Wildlife

AQUATIC/RIPARIAN HABITAT

It is expected that the elimination of livestock would significantly improve aquatic and riparian habitat on BLM administered lands. In general, the long-term effect of livestock removal on about 190 miles of stream and riparian habitat would be a trend towards an increase in the total miles of quality aquatic and riparian habitat. These improvements are expected to be reflected by changes in aquatic habitat quality of approximately 27 additional miles of stream habitat in excellent condition and about 30 additional miles of habitat in good condition. These changes would reduce the number of stream miles in poor to fair condition (see Table 4-4).

The proposed treatments under this alternative could have potential impacts similar to those described under the MFP/Spring Rest Alternative, but due to the differences in proposed acreage, the degree of impact could differ.

Rangeland improvements proposed under this alternative would improve and enhance the aquatic/riparian habitat.

CONCLUSION

It is expected that implementation of this alternative could provide an improvement in aquatic habitat quality by providing approximately 46 additional miles of good to excellent habitat. This improved habitat should also cause fish production to increase (Hubbard 1977; Armour 1973; R.H.S. 1979; and others). It is further expected that the improved habitat quality would result in significant improvements in temperatures, bank stability, and organic input. However, these parameters are unquantifiable at this time due to a lack of data.

Impacts on Livestock Grazing

Under this alternative, all existing livestock use on public lands would be eliminated. All of the 127 operators presently utilizing public land adminstered by the BLM for livestock grazing would be adversely impacted. A greater dependence on other lands would occur. Private lands presently owned or leased are generally not adequate to maintain herds or bands yearlong. With the elimination of grazing on public land, livestock operators would be forced to buy or lease other grazing lands, sell portions or all of their livestock, or purchase feed for a yearlong operation.

Some ranchers could elect to sell base property to subdivision developers. An indeterminable number of ranchers could migrate out of the area and attempt to rebuild their operations with the proceeds of their property sales. Operators with inadequate resources could ultimately be forced out of the livestock business.

Approximately 60,013 AUMs of domestic livestock use per year would be lost. This loss would amount to an animal loss of approximately 5,000 animal units of livestock production in area herds. This represents a 13.3 percent reduction in animal units in the EIS area. While this reduction appears relatively small region-wide (5.7 percent), these AUMs represent the support of a much larger percentage of the area's herds during critical portions of the year. In the spring (4/20 to 6/15), for example, an operator's winter feed supplies could be exhausted, private base properties may be unusable, and national forest systems lands may not be ready for grazing.

CONCLUSION

All range users would be affected. All existing livestock use would be eliminated from public land (60,013 AUMs). A 13.3 percent reduction in animal units would occur in the EIS area.

Impacts on Cultural Resources

Elimination of livestock grazing would reduce the rate of livestock related impacts to cultural resources, such as trampling damage. However, since some facilities and treatments would be implemented for enhancement of other resources (e.g., watershed, wildlife), impacts such as surface disturbance and vandalism would still occur.

Impacts on Visual Resources

If livestock grazing were eliminated, no treatments or projects would be implemented for rangeland management. However, some facilities and treatments would be implemented for the enhancement of other resource values (e.g., wildlife and watershed); therefore, visual resource impacts would be similar to those described for the MFP/ Spring Rest Alternative.

Also, the 1,000 miles of fencing could introduce visual impacts and, however slight, would create adverse impacts in the natural landscape. The initial construction phase, requiring off-road vehicular traffic, would establish a road that might be used for future maintenance, contributing greatly to contrasting lines in the existing landscape. With property line fencing (as this alternative suggests) any onsite location changes due to rock outcrops, heavy tree stands, steep topography, etc., would not be possible, thus forcing a fence through such situations. This would emphasize the adverse impacts on form and line in the natural environment.

However, unless the viewer's observation point were located such that his line of sight paralleled the fence line, the intrusion would hardly be noticed.

CONCLUSION

Visual impacts under this alternative due to rangeland improvements would be similar to those described under the Spring Rest Alternative. Additionally, if fencing were required, it could create contrasts to natural form and line.

Impacts on Recreation Resources

Most recreational activities in the EIS area are enhanced by the scenic quality of the region, as such any impacts to the visual resource would also be recreational impacts (see Visual Resources). The construction of limited rangeland projects and land treatments would have a low adverse short-term impact. The long term would see a general increase in the quality of the vegetative cover which would be a beneficial impact.

The construction of 1,000 miles of fences could have an adverse impact on the visual character of the area and could also be a restricting factor in movement of hunters and snowmobilers.

WILDLIFE

The elimination of livestock grazing would have little effect on wildlife populations and in turn hunting and viewing opportunities in the short term. The long term would experience an increase in deer and elk numbers (see Terrestrial Wildlife) which could provide an additional 20,900 recreation days from deer hunting and 24,123 recreation days from elk hunting. The opportunities for wildlife viewing would be enhanced also.

FISHING

Fishing use in the EIS area would not be impacted in the short term. The long term would experience a 29 percent increase in the aquatic habitat condition (see Aquatic Wildlfe) which should increase fish production and fishing quality. This should somewhat increase fishing use; however, the extent of this increase is unquantifiable since the correlation between these factors is unknown.

WILDERNESS/PRIMITIVE VALUES

This alternative proposes four springs for an allotment which is partially within the Powderhorn Primitive Area. These springs, if within the area, would require an individual evaluation to determine if they would impair the area's wilderness suitability. Generally, with proper design, these projects would not impair suitability and would be allowed.

The elimination of grazing from the Powderhorn Primitive Area would have a long term beneficial impact by allowing the area to return to a more natural condition.

CONCLUSION

Most recreation pursuits would be enhanced in the long term under this alternative (e.g., hunting, fishing, viewing). If fencing were required, some visual quality and recreation access could be affected.

Impacts on Economics

The proposed elimination of livestock grazing on public lands will be analyzed as to its effect on income, employment, public finance and tax base, social well-being, and social and cultural values. Because no vegetation would be allocated to livestock in the future, the impacts identified would have both short-term and long-term consequence.

INCOME

Under this alternative all 127 operators would have their grazing privileges on public lands eliminated. Table 4-8 shows the effect this would have on gross and net revenues for each model group.

Short-term and long-term gross revenue would be reduced by an estimated $5,949,896 from $9,640,100 to $3,690,204. The business activities multiplier of 2.12, when applied to this figure, shows that total sales in the local economy would be reduced by another $6,551,884 for a total loss in business activity of $12,613,780. This would severely affect the agriculture service sector of the local economy, making their operations less profitable. If any of these were to go out of business, then it would be more difficult for ranchers to obtain needed supplies.

Net revenue, which is direct income to the ranching families, would be reduced in both the short and long-term by $1,904,264 from a loss of $208,430 to a net loss of $2,112,694. Applying the income multiplier of 2.92 to this indicates that an additional reduction of $3,656,187 in personal income would occur in the EIS area as the indirect result of reducing use of public vegetation. The changes under this alternative could cause an undeterminable number of ranchers to go out of business and result in the consolidation of ranch units. These income losses would be irretrievable to those affected.

Land treatments and projects would cost an estimated $473,613 to implement and construct. If an estimated 20 percent of this total cost is returned as income by EIS area households, the income would be $94,723. This would be spread over the several years that would be required to implement the proposed projects. The actual magnitude and significance of these impacts is dependent upon the number of contractors and the size of the labor force employed from within the EIS area.

Annual expenditures for maintenance and replacement would represent an ongoing impact in the area. It is estimated that the annual maintenance and replacement cost of these projects would be $14,906. If 30 percent of this were to become personal income, $4,472 would be available to households in the EIS area.

Under this alternative all of the vegetation on public lands would be made available to wildlife and other values. This would allow populations of these animals to increase. EIS area residents would realize a long-term income increase of $1,554,640 from $2,841,020 to $4,395,660 from deer and elk hunting.

EMPLOYMENT

Implementation of this alternative would result in a reduction of 125 man months of BLM labor used in maintenance of range projects and range supervision from 220 to 95 man months in the short term. In the long term BLM employment would be reduced to 380 man months, 500 below the projected 880 man months under the No-Action Alternative.

There would be an estimated decrease in the use of hired labor by EIS area ranchers of 32.3 man-years. This would be both a short term and a long-term impact since no vegetation on public lands would be made available to livestock in the future.

PUBLIC FINANCE AND TAX BASE

As indicated previously, there would be a decrease in use of vegetation in the EIS area by 60,013 AUMs. This decrease would represent economic value to the 127 ranches involved. The relative value of these ranches and of the EIS area tax base would be decreased in both the long and short term.

Currently the value of livestock ranches in western Colorado is about $3,000 per animal unit carrying capacity. A decrease of 60,013 AUMs would translate into a decrease of 5,001 animal units which would decrease the short and long term value of the affected ranches by $18,003,000.

In the short and long-term the total assessed value of the three EIS area counties would be decreased by $900,150, assuming ranch land is assessed at 5 percent of its market value. The elimination of grazing on public land would result in a decrease in property taxes collected of $60,337. This would be a decrease of 1.9 percent of the 1978 property tax revenue. These revenue losses would be irretrievable for the counties involved.

CONCLUSION

This alternative would result in a short and long-term reduction in gross and net income of the affected ranchers and in the use of hired labor on these ranches. Rancher wealth and associated county assessed values and tax revenues would also decrease. Income to EIS area residents from range improvments and treatments and from deer and elk hunting would increase.

TABLE 4-8

RANCH SIZE AND INCOME EFFECTS--ELIMINATION OF LIVESTOCK GRAZING ALTERNATIVE

Model	Number of Ranches	Total BLM AUM Reduction	Average AUM Reduction per Ranch	Gross Revenue Changes per Ranch	Gross Revenue Changes/ All Ranches	Net Revenue Changes per Ranch	Net Revenue Changes/ All Ranches
I	55	10,774	196	$ -9,673	$ -532,015	$ -3,064	$ -168,520
II	30	16,205	540	-41,283	-1,238,490	-15,364	-460,920
III	9	7,336	815	-86,371	-777,339	-57,030	-513,270
IV	13	12,737	979	-80,662	-1,048,606	-23,847	-310,011
V	5	1,217	246	-39,223	-196,115	-17,232	-86,160
VI	6	5,990	130	-104,729	-628,374	-40,228	-327,528
VII	4	966	261	-9,417	-37,668	2,690	10,760
VIII	3	2,257	948	-147,561	-442,683	-16,205	-48,615
TOTAL CHANGE	125	60,013			$ 5,949,896		$-1,904,264
EXISTING					$ 9,640,100		-208,430
NET					$ 3,690,204		$-2,112,694

Source: BLM Range Automated Data System, 1978, for ranch sizing.
Note: There are also two operators with 25 AUMs who run only horses that would be affected by this alternative.

Impacts on Social Conditions

In the short term and the long term the social well-being of the 185 families associated with the income losses would be adversely impacted.

Some of these 185 families could also be adversely impacted if they were not able to remain in the range livestock business due to inability to sustain the vegetation losses, since the dependency on BLM administered vegetation of some ranches associated with these families is relatively critical. Some of these individuals could be adversely impacted as a result of the social and occupational dislocation which could result from the inability to survive the vegetation use reductions.

SOCIAL AND CULTURAL ATTITUDES

The elimination of grazing would conflict with aspirations held by the ranching community, since it would diminish the relative importance of what many in livestock ranching consider to be a justified and important land use. Those directly impacted would feel themselves deprived of opportunities to pursue what they consider to be a hard-working, independent existence.

Short-Term Uses vs. Long-Term Productivity--Elimination of Livestock Grazing Alternative

In the long term, vegetation would improve from 14 percent (43,051 acres) to 82 percent (250,575 acres) in good condition; total production would increase from 518 to 865 pounds/acre/year; and cover would increase from 18 to 32 percent basal. Also, there would be an increase to excellent condition vegetation from none at present to 15 percent (47,756 acres). Even without livestock grazing, vegetation response on the alpine slopes range site would be minimal, due to such areas slow healing process.

There would be short-term increases in erosion rates (from 929,129 to 991,812 ton/year); however, in the long term, erosion rates would decrease (to 299,719 tons/year).

In the short term average infiltration capacity on treated areas would decrease by 17 percent (from 1.91 to 1.58 inches/hour), while the average volume of surface runoff is expected to increase by 28 percent (from 0.2510 to 0.3211 acre-feet/sq mi/6 month grazing season). However, in the long term, infiltration capacity would increase by 33 percent (from 1.91 to 2.52 inches/hour) and surface runoff would be reduced by 63 percent (from 0.2510 to 0.0926 acre-feet/sq mi/6 month grazing season). A long-term decrease in sediment production would also occur. Long-term soil compaction rates would decrease by 31 percent on untreated areas and 44 percent on treated areas.

In the short term, no changes in wildlife population numbers would occur. However, long term elk numbers should increase (to 12,800 winter; 4,100 summer; 300 yearlong), mule deer numbers should increase (to 25,300 winter; 6,600 summer), pronghorn numbers should increase (to 640 yearlong), bighorn sheep numbers should increase (to 160 winter; 190 summer; 120 yearlong), and mountain goat numbers should increase (to 35 winter).

In the long term, there should be an increase of 27 additional miles of excellent condition aquatic habitat and 30 additional miles of good condition. These increases would come from present poor or fair condition areas.

In both the short and long term, domestic livestock grazing would be eliminated on public lands (60,013 AUMs). This would amount to a loss of 5,000 animal units in area herds, a 13.3 percent loss in animal units in the EIS area, and a regionwide loss of 5.7 percent in animal units. Such a loss would force affected operators to find alternative feed sources or reduce their herd sizes.

Due to long-term increases in wildlife herd sizes, recreation days would also increase (elk by 24,123 and mule deer by 20,900). There could also be long term increases in fishing quality.

Due to the loss of grazing privileges on public land gross revenue in the EIS area would be reduced from $9,640,100 to $3,690,204 and net revenue from -$208,430 to -$2,112,694 in both the short and long term.

The income received by EIS area households from construction and implementation of rangeland improvement ($94,723) would be a short-term beneficial impact. Annual maintenance costs returned to EIS area households ($4,472) would be long-term benefits.

The eliminated allocations would reduce ranch values by $18,003,000 in the short and long term. The counties' tax base would be decreased by $900,150 and property tax by $60,337.

There would be short and long-term impacts to the social well being of the affected operators, since livestock ranching is a way of life for most of them.

Adverse Impacts--Elimination of Livestock Grazing Alternative

The temporary addition erosion losses on treated areas would be adverse impacts, as would the temporary decreases in infiltration rates and increases in erosion rates on treated areas.

The loss of 60,013 AUMs of livestock vegetation would be an adverse impact. If some operators were forced out of business due to these eliminations, the results would be adverse.

The losses in gross revenue ($5,949,896), net revenue ($1,904,264), tax bases ($900,150), ranch values ($18,003,000), and property tax revenues ($60,337) would be adverse impacts.

In addition, 1,000 miles of fencing could have adverse impacts on recreation access, visual resources, and big game movement.

OPTIMIZE WILDLIFE AND WATERSHED VALUES ALTERNATIVE--IMPACTS

Impacts on Vegetation

INTRODUCTION

Under the Optimize Wildlife and Watershed Alternative, livestock use in the EIS area would be reduced from 60,013 AUMs (the present situation) to 20,745 AUMs. Big game use would be increased from 36,141 AUMs to 57,983 AUMs. The vegetation response in this alternative would largely be due to the modification in use (90 percent from allocations and treatments, and 10 percent from grazing systems). Appendix V-1 shows the expected vegetation situation by 2005 under the Optimize Wildlife and Watershed Alternative; Table 4-1 summarizes the vegetation impacts.

SAGEBRUSH-DOMINATED RANGE SITES

As shown in Table 4-1, production (total pounds/acre/year) would increase from 518 (the existing situation) to 884, by 2005. Cover would increase from 18 to 34 percent basal, and condition would improve from 14 percent (43,051 acres) in good and excellent condition, to 98 percent (301,096 acres) in good and excellent condition.

Comparison with the elimination alternative shows a greater increase in production under this alternative by 2005 (865 for elimination; 884 for optimize). This would be due to the larger amount of vegetation treatments and the inherent low productivity of sagebrush-dominated range sites without treatment. Robertson (1947) found that mature sagebrush severely competes with and suppresses perennial grasses within a radius of roughly one meter, and as the stands are reduced to wider spacing, release from sagebrush competition will make conditions progressively better for growth of grasses. Vegetation treatment followed by seeding where necessary would reduce the sagebrush density and result in significant increases in herbaceous grass production.

The vegetation response would be largely due to the livestock grazing in the EIS area. However, increases in numbers of big game would also affect the vegetation response. The bulk of big game use of sagebrush-dominated range sites would be in winter. Increased big game numbers would result in reductions in browse on the sagebrush-dominated range sites. This is shown in Table 4-1, as species composition of sagebrush and would decrease from 39 percent (the existing situation) to 21 percent by 2005. The species composition of grass in the EIS area would increase from 29 to 59 percent by 2005. The increase in grass would be due to a decrease in competition from sagebrush, and non-use on grass during most of the growing season at lower elevations. Big game would be at higher elevation summer ranges generally from June to November, depending on yearly weather conditions.

Localized areas in the sagebrush-dominated range sites would show a greater decrease in the species composition of sagebrush than shown on Table 4-1, and also less of an increase in grass than is shown. These localized areas are steep, south-facing slopes in the sagebrush zone, that are free from snow during most winters. Browse on these sites receives excessive use during winter, and dormant grass plants may be chewed off below the soil surface (Nagle and Harris 1966). Trampling in recently thawed, soft soil may kill some herbaceous perennial plants (Nagle and Harris 1966).

GRASSLAND/MEADOW RANGE SITES

The grassland/meadow range sites are subalpine loam (American Flats/Silverton) and mountain meadow. The mountain meadow range site corresponds with the riparian zone, and will be discussed in that section.

In the subalpine loam range site, production is expected to increase from 731 to 1,300 pounds/acre/year under the Optimize Wildlife and Watershed Values Alternative, by 2005. Cover would increase from 18 to 40 percent basal, while condition would improve from 1 percent (61 acres) in good and excellent condition to 75 percent (5,037 acres).

Big game, particularly elk, would utilize the subalpine load site during the growing season, since it is part of their summer range. However, the use is not expected to result in the same utilization rate on desirable grasses as if cattle were occupying the range, largely due to the tendency for big game to utilize more forbs and browse during summer than cattle, and the fact that big game use more vegetation in timbered areas during summer than cattle (Mackie 1970; Jones 1965).

RIPARIAN ZONE

The impacts shown for the mountain meadow range site (Table 4-1) are respresentative of those for the riparian zone, since by definition, both areas are naturally subirrigated. Production in the mountain meadow site would increase from 1,495 to 2,300 pounds/acre/year by 2005. Cover would increase from 50 to 65 percent basal, while condition would improve from 11 percent (398 acres) in good and excellent condition to 100 percent (3,672 acres) in good or excellent condition.

Certain areas of the riparian zone within big game winter range may receive excessive use during severe winters, as discussed under the elimination alternative.

CONCLUSION

Under the Optimize Wildlife and Watershed Values Alternative all components of the vegetation would show a general improvement by 2005 as shown in Table 4-1. Production in the sagebrush-dominated range sites would increase from 518 to 884 pounds/acre/year by 2005. On grassland/meadow sites production would increase from 731 to 1,300 (subalpine loam) and from 1,495 to 2,300 pounds/acre/year (mountain meadow). The impacts shown for the mountain meadow site also reflect those for the riparian zone.

No significant (quantifiable) impacts would occur in alpine areas under the Optimize Wildlife and Watershed Values Alternative, primarily because of the slow rate of change of the alpine vegetation.

An unquantifiable, yet expected minor decrease, in the condition of *Astragalus microcymbus* (a rare forb) may occur as a result of the livestock reductions proposed in the Optimize Wildlife and Watershed Values Alternative. *A. microcymbus* appears to be an increaser plant in the presence of livestock grazing.

Impacts on Soils

Long-term sheet and rill erosion rates in the Gunnison Basin portion of the EIS area are anticipated to decrease an average of approximately 49 percent compared to the present erosion rate as a result of vegetation allocation adjustments and grazing systems (Appendix S-2). Short-term erosion rates would be unchanged. There would be no measurable change in erosion rates for the seven allotments in the EIS area that would continue their unalloted status for livestock. Erosion rates are expected to decrease about 40 percent on the two allotments in the EIS area that were grazed by livestock in the past but would not be grazed under this alternative.

Vegetation treatment on up to 111,458 acres could reduce erosion approximately 71 percent from the present rate (from 3.1 to 0.9 tons/acre/year) on the treated areas based on predicted increases in vegetation cover. This assumes a high sagebrush kill ratio is achieved, reseeding is performed where needed, and retreatment is carried out when needed. The short-term erosion rates after vegetation manipulation would increase approximately 58 percent from the present rate to 4.9 tons/acre/year on the treated acreage. The short-term erosional impacts of each method are described in the MFP/Spring Rest Alternative impacts discussion.

Riparian areas long-term sheet and rill erosion would be reduced approximately from 0.13 to 0.04 tons/acre/year under this alternative.

Soil compaction from livestock trampling would be reduced approximately 20 percent for the Gunnison Basin over the long term by allocation adjustments and grazing systems and be reduced 36 percent on areas where vegetation treatments would be implemented.

The range improvement facilities proposed for this alternative would not affect the overall short-term erosion rate in the EIS area because of the small acreage involved.

Erosion rates for the American Flats/Silverton area are not quantifiable at the present time due to a lack of data; however, the overall affect of this alternative would probably be a slight decrease in erosion rates in the alpine areas and minor healing of trailing scars. Further, physical damage to soils by livestock would be reduced, and the soil compaction by livestock would recover considerably. The subalpine areas would show a decrease in erosion and soil compaction roughly proportional to the increase in vegetation basal cover (refer to Vegetation discussion).

Wind erosion would be anticipated to decrease a slight but unquantifiable amount in the EIS area under this alternative.

CONCLUSION

In summary, soil erosion rates and compaction are anticipated to decrease approximately 49 percent (from 3.1 to 1.6 tons/acre/year) and 20 percent, respectively as a result of vegetation allocation adjustments and grazing system implementation. Erosion and soil compaction would decrease approximately 73 percent (from 3.1 to 0.9 tons/acre/year) and 36 percent, respectively on areas where vegetation treatments would be implemented. Short-term erosion on rangeland in the Gunnison Basin portion of the EIS area would increase to approximately 1,129,753 ton/year due to vegetation treatments. Long-term erosion rates would decrease from the present rate of approximately 929,129 ton/year to approximately 389,635 tons/year.

Impacts on Water Resources

WATER QUALITY

On the areas proposed for vegetation treatments, the long-term sediment production would decrease by 58 percent. However, the short-term sediment production would increase 15 to 56 percent depending upon: type of stream (perennial, etc.), amount of annual precipitation, soil type, land slope, vegetation density, type of treatment, and weather conditions at the time of treatment.

Resulting from the proposed grazing systems and intensities, on lands not scheduled for land treatments, the long-term sediment production would be reduced by 49 percent. In the short-term, the sediment production would essentially remain the same as the present condition.

See Appendix W-1 and Water Resources, Introduction to Impacts for a discussion on sediment quantification. For a more detailed discussion on impacts resulting from vegetation manipulations see impacts of the MFP/Spring Rest Alternative.

WATER QUANTITY

Infiltration and Runoff

In the short term, the average infiltration capacity (weighted average based on number of acres proposed for each major type of vegetatation manipulation), combining all vegetation treatments is estimated to decrease by 17 percent (from 1.91 to 1.58 inches/hour) while the average volume of surface runoff is expected to increase by 28 percent (from 0.2510 to 0.3211 acre-feet/sq mi/6 month grazing season).

In the long-term, on areas proposed for land treatment, the average infiltration capacity would experience an increase of 36 percent (from 1.90 to 2.59 inches/hour) while the volume of surface runoff would decrease by 74 percent (from 0.2510 to 0.0342 acre-feet/sq mi/6 month grazing season).

On lands not scheduled for land treatments, the proposed grazing systems and intensities would not create any significant change, from the present, in the short term infiltration capacity and surface runoff volume. However, the long-term average infiltration capacity would increase by 20 percent (from 1.91 to 2.30 inches/hour) and the surface runoff would decrease by 48 percent from 0.2510 to 0.1317 acre-feet/sq mi/6 month grazing season for untreated areas. Therefore, impacts to water quality resulting from the changes in infiltration and sediment yield would be similar to those discussed in the spring rest alternative.

Water Use

The total amount of water stored by reservoirs would be 250 acre-feet annually. Livestock consumption would amount to 16 acre-feet annually.

There would be water lost due to evaporation from the proposed rangeland water improvements. However, due to the unknown surface area of developments, it is impossible to quantify these losses. Sediment production would be reduced where water storage by proposed stock reservoirs weakens high peak flows. This sediment reduction would be both a long and short-term impact.

CONCLUSION

In the short term, the total sediment production is expected to increase between 6 and 21 percent while the total volume of surface runoff for a 6 month annual grazing season would increase from 117 to 130 acre-feet.

In the long term, the total sediment production would be reduced by 52 percent while the total volume of surface runoff for a 6 month annual grazing season would decrease from 117 to 45 acre-feet.

Impacts on Terrestrial Wildlife

Under this alternative, all of the overlap in vegetation utilization between livestock and big game would be allocated to big game. With this relatively low level of livestock use, the wildlife habitat types would improve at a rate and degree similar to those under the Elimination of Livestock Grazing Alternative. Habitat under this alternative would improve substantially. There would be an adverse impact to the Utah tiger salamander in the long term due to a probable loss of maintained stockpond habitat, but there would be short and long term beneficial impacts to almost all other wildlife species occurring in the EIS area including the three threatened and endangered species (see Tables 4-2 and 4-3).

Impacts on Aquatic Wildlife

AQUATIC/RIPARIAN HABITAT

Implementation of this alternative should result in improvements that would affect the aquatic and riparian habitat along approximately 170 miles of stream within the Gunnison EIS area. It is estimated that an additional 8 miles of stream would improve to excellent condition and the number of stream miles in good condition would increase by 66 miles over the present condition. (Table 4-4).

The treatments under this alternative could have the same potential impact as described under the MFP/Spring Rest Alternative, but the intensity would differ due to a difference in acreage allocations.

Properly implemented rangeland improvements should result in positive impacts similar to those described under the MFP/Spring Rest Alternative.

CONCLUSION

Under this alternative, it is estimated that there would be a net improvement of nearly 40 percent over the present situation. Specifically, the number of stream miles in poor to fair condition would decrease from approximately 89 miles to 15 miles and the amount in good to excellent condition would increase from 96 miles to about 170 miles. These changes should also cause an increase in the total pounds/acre of fish production (Hubbard 1977; Armour 1973; R.H.S. 1979; and others). It is also anticipated that there would be a significant improvement in stream temperatures, bank stability, and organic input. Quantification of these latter parameters is not possible at this time due to a lack of data.

Impacts on Livestock Grazing

Under this alternative approximately 20,745 AUMs would be allocated to livestock for the short term with long-term allocation increasing to 35,403 AUMs. This represents a 66 percent reduction from the present situation and a 53 percent reduction from the proposed action in the short term. In addition, further reductions in use could be administered on allotments where wildlife, watershed, and other resource objectives were not being met within the desired time frame.

To compensate, as with the elimination alternative, for reductions in AUMs or loss of grazing privileges on public land, livestock operators would either have to purchase additonal feed, lease other private pasture, or rely on grazing privileges on other federally administered lands.

CONCLUSION

In general, livestock operators with inadequate resources to make the transition to reduced livestock numbers or season of use could be forced out of the livestock business.

Impacts on Cultural Resources

Since this alternative would include livestock grazing, rangeland improvement facilities, and rangeland treatments, cultural resource impacts such as disturbance, destruction, and vandalism would be similar to those described under the spring rest alternative. Differences would be in degree of impact only, depending upon the aerial extent of various activities, and would not be quantifiable.

Impacts on Visual Resources

Since this alternative would involve rangeland treatments and improvement facilities, visual resource impacts described under the spring rest alternative would still occur. Any differences would be in degree, depending upon how many and where the proposed projects were implemented.

Impacts on Recreation Resources

Most recreational activities in the EIS area are enhanced by the scenic quality of the region, as such any impact to the visual resource would also be recreational impacts (see Visual Resources). The construction/implementation of the range projects and 111,458 acres of land treatments would have adverse impacts during the short term. In the long term, after vegetation regrowth, these actions and the reductions in livestock use would improve the area's overall vegetative condition and would be a beneficial impact.

WILDLIFE

The reduction of lvestock use would have little effect on wildlife populations and in turn hunting and viewing opportunities in the short term. The long term would experience an increase in deer and elk numbers (see Terrestrial Wildlife) which could provide an additional 20,900 recreation days from deer hunting and 24,123 additional recreation days from elk hunting. The opportunities for wildlife viewing would be enhanced due to these population increases.

FISHING

Fishing use in the EIS area would not be impacted in the short term. The long term would experience a 39 percent increase in the aquatic habitat condition (see Aquatic Wildlife) which should increase fish production and fishing quality. This should somewhat increase fishing use; however, the extent of this increase is unquantifiable since the correlation between these factors is unknown.

WILDERNESS/PRIMITIVE VALUES

This alternative proposes 11,622 acres of land treatments and 19 miles of trails for allotments which are partially or totally within potential wilderness areas (WSA). These actions, if in the WSA, would require an individual evaluation to determine if they would impair the area's wilderness suitability. Generally, the land treatment would impair and not be allowed, while the trails could be constructed.

The reductions in livestock use in allotments which overlay the Powderhorn Primitive Area would have a beneficial impact in the long term by allowing the area to return to a more natural condition.

CONCLUSION

In the long term, this alternative would improve recreation opportunities by increasing wildlife populations.

Impacts on Economics

This analysis will concentrate on the impacts of this alternative on income, employment, public finance and tax base, social well-being, and social and cultural values.

INCOME

Under this alternative 125 operators would receive a reduction in stocking rates.

Table 4-9 shows the number of operators by each model group receiving reductions or elimination of grazing and the resulting effect on gross and net revenues. To estimate these changes the proposed use was subtracted from the present level to determine changes in the use of BLM administered vegetation. The CSU models were used to determine impacts of these changes.

In total, 119 operators would experience some income loss associated with stocking reductions and elimination of grazing.

Gross income would be reduced by an estimated $3,100,785 from $9,640,100 to $6,539,315,

TABLE 4-9

RANCH SIZE AND INCOME EFFECTS--OPTIMIZE WILDLIFE AND WATERSHED ALTERNATIVE

Model	Number of Ranches	Total BLM AUM Reduction	Average AUM Reduction per Ranch	Gross Revenue Changes per Ranch	Gross Revenue Changes/ All Ranches	Net Revenue Changes per Ranch	Net Revenue Changes/ All Ranches
I	55	6,747	123	$ -2,066	$ -113,630	$ 1,425	$ 78,375
II	30	10,617	353	-28,546	-856,380	-12,885	-386,550
III	9	5,185	576	-61,055	-549,495	-40,105	-360,945
IV	13	8,076	621	-52,198	-678,574	-12,164	-58,132
V	5	965	193	-31,204	-15,620	-12,818	-64,090
VI	6	5,099	850	-68,253	-409,518	-29,968	-179,807
VII	4	563	141	-514	2,056	5,770	23,080
VIII	3	2,008	669	-158,504	475,512	-66,834	-200,502
TOTAL CHANGE	25	39,278			$ 3,100,785		$-1,040,851
EXISTING SITUATION					$ 9,640,100		$ -208,430
NET					$ 6,539,315		$-1,249,281

Source: BLM Range Automated Data System, 1978, for ranch sizing.

which when applied to the business activities multiplier of 2.12, indicates that sales to other sectors of the EIS area economy would be reduced by a total of $6,573,664. In the long run, gross income would be reduced by $1,807,678 from $9,640,100 to $7,832,422. Total sales in other sectors of the EIS area would be reduced by $3,832,277.

Net revenue, which is direct income to the ranching families, would be reduced by $1,040,851 from a net loss of $208,430 to a net loss of $1,249,430. Applying the income multiplier of 2.92 to this indicates that an additional $2,398,906 reduction in indirect income would occur in the EIS area. Thus, the total short-term direct plus indirect income effect would be an estimated $3,039,285 reduction which would be 4.9 percent of the 1976 EIS area personal income. Income lost during this period would be irretrievable to EIS area ranchers. In the long run net income would be reduced by $843,427 to a total loss of $1,051,857.

Almost all of the grazing use of public lands in the EIS area takes place during the summer. It is during this time that hay is produced on the ranches. The successful operation of most ranches requires haylands be available to produce hay during the summer. Because of this it is extremely difficult to find alternative feed sources to public lands. Ninety-one of the operators would have to provide over 5 percent of their summer feed requirements from other sources during the time the animals are normally on public lands.

Changes in economic conditions on affected ranches could cause an undetermineable number of them to go out of business and could also stimulate some consolidation of ranch units.

Land treatment and range improvement projects associated with this alternative have been described in Chapter 2. Because land use planning for the EIS area has not been completed the figures given represent the maximum acres that would be treated and projects developed. The following figures are also maximums that would be reached if all projects were completed.

Land treatment and projects would cost an estimated $1,938,359 to implement and construct. If an estimated 20 percent of this total cost is returned as income by EIS area households, the income would be $387,672. This would be spread over the several years that would be required to implement the proposed projects. The actual magnitude and significance of these impacts would be dependent upon the number of contractors and the size of the labor force employed from within the EIS area.

Annual expenditures for maintenance would represent an ongoing impact in the area. It is estimated that the annual maintenance cost of these projects would be $63,976. If 30 percent of this were to become personal income, $19,193 would be available to households in the EIS area.

Maintenance costs have both positive and negative aspects. On the positive side, the increased income, although minimal, would be welcome. However, some of the actual annual maintenance would be assumed by ranch operators (e.g., fences and springs) as a condition of AMP implementation.

Thus, it appears that some of the beneficial income impacts for construction workers, ranch hands, etc., would come at the expense of livestock operators.

Income to EIS area residents from deer and elk hunting would remain the same as at present in the short term. In the long term this income would increase by $1,554,640 from $2,841,020 to $4,395,660.

EMPLOYMENT

Implementation of this alternative would require a total of 431 man months of BLM labor for survey, design, contract supervision, maintenance, and range supervision in the short term. This would be 211 man months above the 220 currently required. In the long term 1,722 man months would be required, 842 above the 880 projected under the No-Action Alternative.

There would be an estimated decrease of 21.6 man-years of hired labor on EIS area ranches as the result of the reduction in vegetation allocations. This would be a short-term reduction. In the long run, use of hired labor would be reduced by 10.7 man-years.

PUBLIC FINANCE AND TAX BASE

As indicated previously there would be a decrease in allowable AUMs from the presently licensed level by 39,268 AUMs. This decrease would represent economic value to the 125 ranches involved. Therefore, the relative value of these ranches and of the EIS area tax base would be decreased in the short term.

Currently the value of livestock ranches in western Colorado is about $3,000 per animal unit carrying capacity. A decrease of 39,268 AUMs would translate into a decrease of 3,272 animal units which would decrease the present value of the affected ranches by $9,817,000. The long-term loss would amount to $6,153,000.

A related decrease would involve the tax base. In Colorado, property can be assessed at 30 percent of its market value. In recent years agricultural land has tended to be assessed at a level much below this because of the rapid rise in land prices. If ranch land is assessed at 5 percent of its market value, the decrease in vegetation allocations would result in a decrease in assessed value of the affected counties of $490,850. This represents 1.1 percent of the 1978 assessed value of Gunnison, Hinsdale, and San Juan counties. An estimated $33,821 in property taxes would be lost to the three counties. In the long term, the counties would loose $307,650 in assessed value and $20,627 in property tax revenue. These tax revenues would represent irretrievable losses to counties in the EIS area.

CONCLUSION

With this alternative gross and net rancher income would be lower than present levels in both the short and long term. Ranch employment, rancher wealth, county assessed value, and property tax revenues would also be lower. Income from range improvements and treatments and from deer and elk hunting would be higher than at present.

Impacts on Social Conditions

SOCIAL WELL-BEING

In the short term and long term, the social well-being of the 185 families associated with the income losses would be adversely impacted. It is possible that the vegetation and subsequent income loss would be regained, depending upon future allocative decisions coming out of the BLM planning system. However, the possibility does exist that the vegetation would not be regained by all impacted ranches. Consequently, the income loss could be long term for some individuals.

Some of these 185 families could also be adversely impacted if they were not able to remain in the range livestock business due to inability to sustain the vegetation losses, since the dependency on BLM administered vegetation of some ranches associated with these families is relatively critical. Some of these individuals could be adversely impacted as a result of the social and occupational dislocation which could result from the inability to survive the vegetation use reductions.

SOCIAL AND CULTURAL ATTITUDES

The BLM vegetation use reductions could conflict with aspirations held by the ranching community, since they would diminish the relative importance of what many in livestock ranching consider to be a justified and important land use. Those directly impacted by reductions could feel themselves deprived of opportunities to pursue what they consider to be a hard-working, independent existence.

Short-Term Uses vs. Long-Term Productivity--Optimize Wildlife and Watershed Values Alternative

In the long term, vegetation in the sagebrush dominated range sites would improve from 14 percent (43,051 acres) to 98 percent (301,096 acres) in good and excellent condition; total production would increase from 518 to 884 pounds/acre/year; and cover would increase from 18 to 34 percent basal.

Erosion rates could increase in the short term (from 929,129 to 1,129,753 ton/year); however, long-term erosion rates should be reduced (to 389,635 tons/year).

In the short term, average infiltration capacity on treated areas would decrease by 17 percent (from 1.91 to 1.58 inches/hour) and the average surface runoff volume would increase by 28 percent (from 0.2510 to 0.3211 acre-feet/sq mi/6 month grazing season). In the long term, however, infiltration capacity would increase by 20 percent (to 2.30 inches/hour) and surface runoff decrease by 48 percent (to 0.1317 acre-feet/sq mi/6 month grazing season). Long-term compaction rates would be reduced by 20 percent on untreated areas and 36 percent on treated areas.

In the short term, wildlife numbers would not change. By the long term. elk numbers would increase (to 12,800 winter; 4,100 summer; 300 yearlong), mule deer numbers would increase (to 25,300 winter; 6,600 summer), pronghorn numbers would increase (to 640 yearlong), bighorn sheep numbers would increase (to 160 winter; 190 summer; 120 yearlong), and mountain goat numbers would increase (to 35 winter).

In the long term, an additional 8 miles of stream would improve to excellent aquatic habitat condition and an additional 66 miles to good condition.

In the short term, livestock vegetation allocations would decrease to 20,745 AUMs. In the long term, with improved rangeland condition the livestock allocation could be set at 35,403 AUMs.

Few short-term changes would occur in wildlife hunting and viewing opportunities. However, by the long term, increases in animal numbers should provide an additional 20,900 recreation days for mule deer and 24,123 additional days for elk. Some long-term increases in fishing quality could also occur.

In the short term, gross income would be reduced from $9,640,100 to $6,539,315 and net revenue reduced by $1,040,851 from a net loss of $208,430 to a net loss of $1,249,430. By the long term, gross revenue would be reduced by $1,807,678 from $9,640,100 to $7,832,422 and net revenue reduced by $843,427 to a total loss of $1,051,857.

The income received by EIS area households for construction of range improvements ($387,672) would be a short-term beneficial impact. Annual maintenance costs returned to EIS area households ($19,193) would be long-term benefits.

In the short term ranch value would decrease by $9,817,000; by the long term the decrease would be $6,153,000. Short term losses to the counties' tax base would be $490,850 and losses in property tax revenue would be $33,821. In the long term, losses to the tax base would be $307,650 and to property tax revenues $20,627.

There could also be short and long-term decreases in the social well being of the affected operators.

Adverse Impacts--Optimize Wildlife and Watershed Values Alternative

The temporary increases in erosion, increases in surface runoff, and decreases in infiltration rates would be adverse impacts.

The reduction in livestock vegetation allocations (by 39,268 AUMs) would be an adverse impact.

The losses in gross revenue ($1,807,678) and net revenue ($843,427) would be adverse impacts. Losses in ranch values ($9,817,000), tax bases ($490,850), and property tax revenues ($33,821) would be adverse impacts.

OPTIMIZE LIVESTOCK GRAZING ALTERNATIVE--IMPACTS

Impacts on Vegetation

INTRODUCTION

Under the Optimize Livestock Grazing Alternative, initial livestock use in the EIS area would be increased from 60,013 AUMs (the present situation) to 61,356 AUMs. Big game use would decline, going from 36,141 AUMs to 17,386 AUMs. The vegetation response under the Optimize Livestock Grazing Alternative would be largely due to the treatments and the modified allocation levels. Grazing systems would be of lesser importance. Appendix V-1 shows the expected vegetation situation by 2005, by range site. The vegetation impacts are summarized in Table 4-1.

SAGEBRUSH-DOMINATED RANGE SITES

A general decrease in the components of the vegetation situation would occur by 2005 under the Optimize Livestock Grazing Alternative.

Table 4-1 shows the additive vegetation impacts of the allocation levels, grazing systems, and vegetation treatments proposed in the Optimize Livestock Grazing Alternative. Some 201,551 acres of sagebrush treatment are proposed. Production on the sagebrush-dominated range sites would increase from 518 to 780 pounds/acre/year by 2005. Cover would increase from 18 to 30 percent basal while condition would go from 14 percent (43,051 acres) in good condition to 64 percent (196,425 acres) in good and excellent condition. The estimates of vegetation impacts are based on the assumption that where necessary (in areas where significant sagebrush reinvasion has occurred) retreatment would be conducted before 2005. Retreatments are built into the annual maintenance costs for range projects.

Although the level of livestock use and treatments proposed in the EIS area would be largely responsible for the vegetation impacts shown, reduced big game use would play a role. Decreased utilization of sagebrush by big game during winter results in increased vigor and reproduction of sagebrush, which may compete with and crowd out desirable grass species. This is supported by a 1979 examination of two 30-year livestock and wildlife exclosures in the Gunnison Basin (the Horn Gulch and Dillon exclosures). In both exclosures a marked increase in density and vigor of big sagebrush was evident within the portion where big game are excluded.

GRASSLAND/MEADOW SITES

In the grassland/meadow range sites a decrease in the components of the vegetation situation is expected by 2005. As shown on Table 4-1, production would decline from 731 (the existing situation) to 650 pounds/acre/year, in the subalpine loam (American Flats/Silverton) range site cover would decline from 18 to 15 percent basal, while the acres in poor condition would go from 40 percent (2,662 acres) to 65 percent (4,365 acres) by 2005.

The mountain meadow range site is discussed in the riparian section.

ALPINE SLOPES

No significant (quantifiable) vegetation response in alpine areas is expected by 2005, primarily due to the very slow rate of vegetation change in the alpine (discussed under the MFP/Spring Rest Alternative).

RIPARIAN ZONE

The impacts shown for mountain meadow range site (Table 4-1) are representative of those for riparian zone, because both areas are subirrigated. Production in the mountain meadow site would increase from 1,495 to 1,525 pounds/acre/year by 2005 under the Optimize Livestock Grazing Alternative. Cover would remain at 50 percent basal, while the acres in good condition would remain at 11 percent (404 acres).

In general, the mountain meadow range site would remain in its relatively poor or fair condition, due to livestock concentration, except sites that receive vegetation treatments would improve slightly.

ENDANGERED AND THREATENED PLANTS

The impact on endangered and threatened plants would not differ significantly from that shown for the MFP/Spring Rest Alternative.

CONCLUSION

In the sagebrush-dominated range sites, a general improvement in the components of the vegetation situation would occur by 2005, due to the additive impacts of allocation, grazing systems, and vegetation treatments. The 201,551 acres of sagebrush treatment proposed would be the main reason for the vegetation improvement. Production would increase from 518 to 780 pounds/acre/year, cover would go from 17 to 30 percent basal, and the acres in good and excellent condition would improve from 14 percent (43,051 acres) to 64 percent (196,425 acres).

The vegetation response of the grassland/meadow range sites under the Optimize Livestock Grazing Alternative is shown on Table 4-1. In subalpine loam (American Flats/Silverton) production would decrease from 731 to 650 pounds/acre/year, and condition would go from 40 percent (2,662 acres) in poor condition to 65 percent (4,365 acres) in poor condition by 2005. In the mountain meadow range site, production would improve from 1,495 to 1,525 pounds/acre/year by 2005. Cover would remain the same (50 percent basal) and the acres in good condition would remain at 11 percent (404 acres). The mountain meadow impacts are indicative of those in the riparian zone.

An insignificant (unquantifiable) impact would occur in the alpine vegetation and on endangered and threatened plants under the Optimize Livestock Grazing Alternative.

Impacts on Soils

Long-term sheet and rill erosion rates in the Gunnison Basin portion of the EIS area are anticipated to remain essentially unchanged from the present erosion rate as a result of vegetation allocation adjustments and grazing systems (Appendix S-2). Erosion rates would be expected to increase approximately 60 percent for the eleven allotments in the EIS area which have not been grazed in the past but would be grazed by livestock under this alternative.

Vegetation treatments on up to 201,955 acres could reduce long term eroision approximately 61 percent compared to the present erosion rate (from 3.1 to 1.2 tons/acre/year on the treated acreage). This is assuming a high sagebrush kill rate, reseeding is performed where needed, and retreatment is performed when needed. The short-term erosion rates after vegetation manipulation would increase to 3.9 tons/acre/year on the treated acreage. The short-term erosional impacts of each method are described in the MFP/spring rest impacts discussion.

Riparian areas would still be subject to high livestock use and erosion would remain at its present level.

Soil compaction from livestock trampling probably would continue to be heavy and infiltration would essentially be unchanged from its present reduced level by allocation adjustments and grazing systems and be reduced approximately 28 percent where vegetation treatments would be implemented.

The range improvements proposed for this alternative would be identical to those proposed for the MFP/Spring Rest Alternative.

Erosion rates for the American Flats/Silverton portion of the EIS area are not quantifiable at present because of an absence of data; however, the general effect of this alternative would probably be unchanged or slightly increased erosion rates and soil compaction. New trailing scars might appear and old ones would remain unhealed.

Wind erosion would be anticipated to decrease a slight but unquantifiable amount under this alternative in the EIS area.

CONCLUSION

To summarize the impacts of this alternative, long-term soil erosion rates and compaction are anticipated to remain unchanged from the present rate as a result of vegetation allocation adjustments and grazing system implementation. Erosion and soil compaction would decrease approximately 61 percent (from 3.1 to 1.2 tons/acre/year) and 28 percent, respectively on acres where vegetation treatments would be implemented. Short-term erosion on rangeland in the Gunnison Basin portion of the EIS area would increase to approximately 1,090,693 tons/year due to vegetation treatments. Long-term erosion would decrease from the present rate of approximately 929,129 tons/year to approximately 569,466 ton/year.

Impacts on Water Resources

WATER QUALITY

On the areas proposed for vegetation treatments, the long-term sediment production wouild decrease by 39 percent. However, the short-term sediment production would increase 5 to 25 percent depending upon: type of stream (perennial, etc.), amount of annual precipitation, soil type, land slope, vegetation density, type of treatment, and weather conditions at the time of treatment.

Resulting from the proposed grazing systems and intensities, on land not scheduled for land treatment, the long-term sediment production would increase by 1 percent. In the short-term, the sediment production would essentially remain the same as the present condition.

See Appendix W-1 and the Water Resources Introduction to Impacts for a discussion on sediment quantification. For a more detailed discussion on impacts resulting from vegetation manipulations see impacts of spring rest, Water Resources.

Impacts resulting from spring developments would be the same as those discussed in the water quality impacts section of the spring rest alternative.

WATER QUANTITY

Infiltration and Runoff

In the short term, the average infiltration capacity (weighted average based on number of acres proposed for each major type of vegetation manipulation), combining all vegetation treatments is estimated to decrease by 8 percent (from 1.91 to 1.76 inches/hour) while the average volume of surface runoff is expected to increase by 13 percent (from 0.2510 to 0.2830 acre-feet/sq mi/6-month grazing season).

On areas proposed for land treatment, the long-term average infiltration capacity would experience an increase of 28 percent (from 1.91 to 2.44 inches/hour) while the volume of surface runoff would decrease by 59 percent (from 0.2510 to 0.1046 acre-feet/sq mi/6 month grazing season).

On lands not scheduled for land treatments, the proposed grazing systems and intensities would not create any significant change in the short term infiltration capacity and surface runoff volume. However, in the long term, the average infiltration capacity would decrease by 1 percent (from 1.91 to 1.90 inches/hour) and the surface runoff would increase by 2 percent (from 0.2510 to 0.2551 acre-feet/sq mi/6 month grazing season). An increase in the infiltration capacity would make less water available for plant growth and ground-water storage. The increased volume of surface runoff would increase peak runoffs (flood hazard), gullying, and sediment production (see Figure 4-4).

Ground Water

On areas not proposed for land treatments, a decrease in the area's infiltration capacity would reduce recharge to ground-water aquifers. The magnitude of this long-term impact is difficult to predict.

Water Use

Under this alternative, livestock would consume essentially the same amount of water as under the proposed action.

CONCLUSION

In the short term, the total sediment production is expected to increase between 3 and 17 percent while the total volume of surface runoff for a 6 month annual grazing season would increase from 117 to 127 acre-feet.

In the long term, the total sediment production would be reduced by 26 percent while the total volume of surface runoff for a 6 month annual grazing season would decrease from 117 to 72 acre-feet.

Impacts on Terrestrial Wildlife

Under this alternative, all of the overlap in vegetation utilization between livestock and big game would be allocated to livestock. Although the total number of AUMs would be the same as in the proposed action and the alternative to optimize wildlife and watershed values (less than in the present situation), there would be more cattle and sheep grazing while big game numbers would be greatly reduced. The number of acres of vegetation that could be treated would be increased. The miles of fence constructed would also increase under this alternative. Table 4-1 shows that the condition of the range sites would decline without vegetation treatment and improve with treatment.

There would be an adverse impact in terms of quantity with reductions of big game numbers necessary to implement this alternative. For almost all of the wildlife species in all the habitat types except the woodland, habitat quality would decline (Tables 4-2 and 4-3). With increased numbers of livestock, wildlife would likely experience increased competition for food, water, cover, and space.

The Utah tiger salamander, however, would probably benefit from an increase in habitat quantity due to construction of additional stock-watering ponds.

THREATENED AND ENDANGERED SPECIES

Through the decline of the habitat for prairie dogs, passerine birds, rabbits, hares, waterfowl, and fish under this alternative, it is highly feasible that a loss of black-footed ferrets, peregrine falcons, and bald eagles could occur. These short and long-term losses, especially when combined with losses elsewhere to precarious populations of these three species, could be an irreversible and irretrievable commitment of the resource.

CONCLUSION

Declines in population numbers and habitat quality would occur for almost all wildlife species under this alternative, including threatened and endangered species. The exception would be the Utah tiger salamander, which could increase as its stockpond habitat was expanded.

Impacts on Aquatic Wildlife

AQUATIC/RIPARIAN HABITAT

Under this alternative, it is expected that the aquatic habitat quality would decrease in terms of the number of miles of good and excellent habitat. There would be a decrease in excellent habitat by approximately 30 miles and a decrease in good habitat by about 40 miles. These changes would be reflected by subsequent increases in the number of stream miles in poor to fair condition.

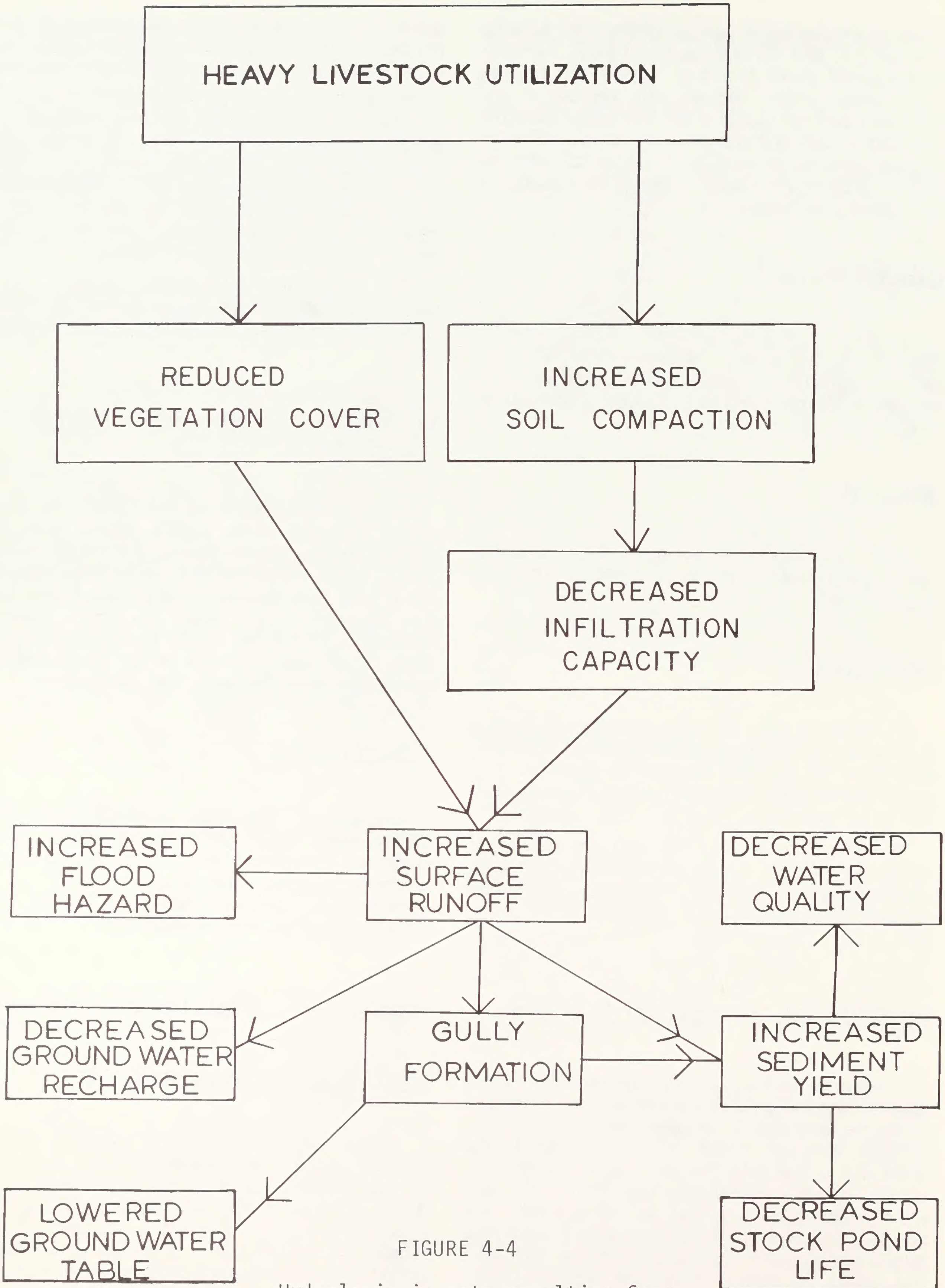
HEAVY LIVESTOCK UTILIZATION
REDUCED VEGETATION COVER
INCREASED SOIL COMPACTION
DECREASED INFILTRATION CAPACITY
INCREASED FLOOD HAZARD
INCREASED SURFACE RUNOFF
DECREASED WATER QUALITY
DECREASED GROUND WATER RECHARGE
GULLY FORMATION
INCREASED SEDIMENT YIELD
LOWERED GROUND WATER TABLE
DECREASED STOCK POND LIFE

FIGURE 4-4

Hydrologic impacts resulting from heavy livestock utilization

The potential adverse impacts from vegetational treatments would be greater in terms of the number of acres under consideration. For a discussion on the potential impacts of spraying, burning, and mechanical release, refer to the MFP/Spring Rest Alternative and to Appendix F-5. There are approximately four times as many acres proposed for spraying under this alternative than under the MFP/ Spring Rest Alternative. This action would increase the potential for adverse impacts resulting from the aerial application of herbicides described under the spring rest alternative. Any anticipated impacts from the treatments and improvements proposed under this alternative would be similar in effect to those mentioned under the MFP/Spring Rest Alternative. The major difference between the two alternatives would be in the intensity or degree of impact.

CONCLUSION

This alternative is expected to result in a net decrease in the quality of the aquatic habitat which can be related to changes in the quality of the riparian habitat. These changes in aquatic habitat quality, resulting in 70 miles of good to excellent habitat declining to a fair to poor condition, are expected to cause a coinciding change in fish production (Hubbard 1977; Armour 1973; R.H.S. 1979; and others). It is also expected that changes in temperatures, bank stability and organic input would also reflect the decline in habitat quality which could result from this alternative.

Impacts on Livestock Grazing

Under this alternative 61,356 AUMs would initially be allocated to livestock grazing. The long-term livestock allocations are expected to reach 92,389 AUMs.

This alternative would impact the livestock industry in the EIS area by more intensive management, an increase in grazing privileges both on existing grazing allotments and on unallotted allotments (i.e., allotments presently unallotted would be adjudicated and term permits issued to qualified applicants), and change in period of use.

This alternative would include implementation of 130 AMPs with a sequential system of grazing livestock and 36 allotments with less intensive management. As with the proposed action, range users would have higher operating costs arising from increased herding of livestock and maintenance of proposed range facilities. More frequent visits to the allotments to gather and move livestock would occur while having to follow the grazing system schedule.

The proposed projects and treatments would improve livestock distribution within pastures or allotments. Through improved distribution and subsequent improvement in range vigor and condition (see Vegetation), an improvement in livestock production would occur (Merrill 1954).

Although an increase in livestock AUMs is recommended under this alternative, the total AUMs allocated to both wildlife and livestock would remain the same as the proposed action. Therefore, the study by Poollen and Lacy (1979) could be used to assume that herbage production would increase (35 to 27 percent) when reduced utilization occurred (heavy to moderate and moderate to light).

Under this alternative competition for vegetation from wintering elk would be minimal. Livestock operators would have to install fewer pannels to protect hay for their winter livestock feeding program.

Fifty allotments would have their turnout dates set back in the spring. Range users would have to purchase additional feed or lease or buy hay to carry their livestock through the period not allowed on public rangeland. Operators on the additional 94 AMP allotments would have higher operating costs arising from increased herding of livestock and maintenance of proposed range improvements. More frequent visits would be needed to gather and move livestock to the next pasture designated for use.

CONCLUSION

Short-term allocation of AUMs would be 61,356; long range allocations are expected to be 92,389 AUMs. More intensive management, higher operating costs, and more frequent visits to allotments is expected.

Impacts on Cultural Resources

Since this alternative would include livestock grazing, rangeland improvement facilities, and rangeland treatments, cultural resource impacts such as disturbance, destruction, and vandalism would be similar to those described under the spring rest alternative. Differences would be in degree of impact only, depending upon the aerial extent of various activities, and would not be quantifiable.

Impacts on Visual Resources

Since this alternative would involve rangeland treatments and improvement facilities, visual resource impacts described under the spring rest alternative would still occur. Any differences would be in degree, depending upon how many and where the proposed projects were implemented.

Impacts on Recreation Resources

Most recreational activities in the EIS area are enhanced by the scenic quality of the region; as such any impacts to the visual resource would also be recreational impacts (see Visual Resources). The construction/implementation of numerous range projects and 201,955 acres of land treatments would have an adverse impact in the short term. In the long term, after vegetation regrowth, the projects would have a minimal adverse impact. The overall appearance of the rangeland would continue its decline under this alternative and be a long-term adverse impact.

WILDLIFE

The increases in livestock use would have a substantial impact on recreation derived from wildlife hunting and viewing. The short and long term reductions in elk and deer populations (see Terrestrial Wildlife) could reduce the long term recreation due to elk hunting by 25,245 days and deer hunting by 13,860 days. The opportunities for wildlife viewing would also be lowered due to these decreases.

FISHING

Fishing use in the EIS area would not be impacted in the short term. The long term would experience a 37 percent decrease in the aquatic habitat condition (see Aquatic Wildlife) which should decrease fish production and fishing quality. This should somewhat decrease fishing use; however, the extent of this decrease is unquantifiable as the correlation between these factors is unknown.

WILDERNESS/PRIMITIVE VALUES

This alternative proposes 21,896 acres of land treatments, cattle guards, and 35 miles of trails for allotments which are partially or totally within wilderness study areas (WSA). These actions, if in the WSA, would require individual evaluations to determine if they would impair wilderness suitability. Generally, those range projects with a high visual impact and most land treatments would impair wilderness suitability and would not be allowed.

The level of livestock grazing under this alternative for allotments which overlay the Powderhorn Primitive Area would increase. This would tend to further degrade the vegetative condition of the area and be a long term adverse impact on visitor enjoyment of the area.

CONCLUSION

Recreation would be impacted under this alternative in the form of lowered hunting, fishing, and viewing opportunities.

Impacts on Economics

the proposed changes in allocation of public vegetation allocations under this alternative will be analyzed as to their effects on income (range livestock-related, contract construction-related, government-related, and recreation-related), employment, public finance and tax base, social well-being, and social and cultural values.

INCOME

Under this alternative 62 operators would receive a reduction in stocking rates, and 63 would actually have their stocking rate increased.

Table 4-10 shows the number of operators by each model group receiving reductions or increases of grazing and the resulting effect on gross and net revenues. To estimate these income changes the proposed level of use was subtracted from the present level to determine changes in use of BLM administered vegetation. The economic impacts on ranching operations as the result of these reductions in vegetation use were determined by using the CSU study explained in Appendix SE-1.

TABLE 4-10

RANCH SIZE AND INCOME EFFECTS--OPTIMIZE LIVESTOCK GRAZING ALTERNATIVE

Model	Number of Ranches	Total BLM AUM Reduction or Increase	Average AUM Change per Ranch	Gross Revenue Changes per Ranch	Gross Revenue Changes/ All Ranches	Net Revenue Changes per Ranch	Net Revenue Changes/ All Ranches
I	55	+ 1,464	+ 27	$ 1,346	$ 74,030	$ 1,186	$ 65,230
II	30	+ 978	+ 33	2,595	77,850	1,399	41,970
III	9	+ 1,136	+ 126	12,899	116,091	8,454	76,086
IV	6	- 3,885	- 648	-24,985	-149,910	-2,893	-17,358
V	13	+ 312	+ 24	10,270	133,510	4,884	63,492
VI	5	- 191	- 38	-2,100	-10,500	-4,994	-24,970
VII	4	+ 162	+ 41	2,679	10,716	1,259	5,036
VIII	3	+ 239	+ 80	17,860	53,580	7,532	22,596
Other *		+ 1,128					
Total Change	125	- 1,343			$ 305,367		$ 232,082
Existing Situation					$ 9,640,100		$ -208,430
Net					$ 9,945,467		$ 23,652

Source: BLM Range Automated Data System, 1978, for ranch sizing.
* Includes allotments currently unallotted and an increase in stock driveway use.

Gross revenue would be increased by an estimated $305,367 which when applied to the business activities multiplier of 2.12, indicates that sales to other sectors of the EIS area economy would be increased by a total of $647,378. In the long term, gross income would increase by $2,216,089. This would mean that total sales in the EIS area would increase by $4,698,109.

Net revenue, which is direct income to the ranching families, would increase by $232,082. Applying the income multiplier of 2.92 to this indicates that an additional $445,597 increase in indirect income would occur in the EIS area. Thus the total direct plus indirect income short-term effect would be an estimated increase of $667,679, which is 1.8 percent of the 1976 EIS area personal income. In the long run, net income to the ranchers would increase by $919,975 and EIS area personal income by $2,686,327.

Almost all of the grazing use of public lands in the EIS area takes place during the summer. It is during this time that hay is produced on the ranches. The successful operation of most ranches requires haylands be available to produce hay during the summer. Because of this it is extremely difficult to find alternative feed sources to public lands. Twenty of the operators would have to provide over 5 percent of their summer feed requirements from other sources during the time the animals are normally on public lands. The proposed grazing schedules would help alleviate some of this problem by allowing the operators to choose when grazing on public lands could best benefit their operations.

Changes in economic conditions on ranches receiving reductions could cause an undetermineable number of them to go out of business and could also stimulate some consolidation of ranch units.

Land treatment and range improvement projects associated with this alternative have been described in Chapter 2. Because land use planning for the EIS area has not been completed the figures given represent the maximum acres to be treated and projects developed. The following figures are also maximums that would be reached if all projects were completed.

Land treatment and projects would cost an estimated $4,168,418 to implement and construct. If an estimated 20 percent of this total cost is returned as income by EIS area households, the income would be $833,684. This would be spread over the several years that would be required to implement the proposed projects. The actual magnitude and significance of these impacts would be dependent upon the number of contractors and the size of the labor force employed from within the EIS area.

Annual expenditures for maintenance would represent an ongoing impact in the area. It is estimated that the annual maintenance cost of these projects would be $146,821. If 30 percent of this were to become personal income, $44,046 would be available to households in the EIS area.

Maintenance costs have both positive and negative aspects. On the positive side, the increased income, although minimal, would be welcome. However, some of the actual annual maintenance would be assumed by ranch operators (e.g., fences and springs) as a condition of AMP implementation.

Thus, it appears that some of the beneficial income impacts to construction workers, ranch hands, etc., would come at the expense of livestock operators.

Income from deer and elk hunting would decrease by $1,350,300 in the short and long term from the present $2,841,000 to $1,490,700.

EMPLOYMENT

Implementation of this alternative would require a total of 560 man months of labor for survey, design, contract supervision, maintenance, and range supervision in the short term. This would be 340 man months above the current level of 220 man months. In the long term BLM employment would increase to 2,240 man months, 1,360 man months above the projected 880 man months required under the No-Action Alternative.

There would be an estimated increase of 0.7 man-years of hired labor on EIS area ranches as the result of the changes in public vegetation allocation. In the long run, an increase of 23.1 man-years of hired labor would be required by EIS area ranches.

PUBLIC FINANCE AND TAX BASE

As indicated previously there would be an increase in allowable AUMs from the presently licensed level by 1,343 AUMs. This increase would represent economic value to the 63 ranches involved. Therefore, the relative value of these ranches and of the EIS area tax base would increase.

Currently the value of livestock ranches in western Colorado is about $3,000 per animal unit carrying capacity. A increase of 1,343 AUMs would translate into an increase of 112 animal units which would increase the present value of the affected ranches by $336,000. In the long term, value of these ranches would increase by $8,094,000.

A related change would involve the tax base. In Colorado property can be assessed at 30 percent of its market value. In recent years agricultural land has tended to be assessed at a level much below this because of the rapid rise in land prices. If ranch land is assessed at 5 percent of its market value, the short-term increase in vegetation allocations would result in a increase in assessed value of the affected counties of $16,800. This represents less than 0.04 percent of the 1978 assessed value of Gunnison, Hinsdale, and San Juan counties. An estimated $1,157 in property taxes would be gained by the three counties. In the long run, assessed value of the counties would increase by $404,700 and property tax revenues by $27,134.

CONCLUSION

Under this alternative gross and net income of EIS area ranchers would increase above present levels. Ranch employment, rancher wealth, county assessed values and property tax revenues, and income from rangeland improvements would also be higher. Income from deer and elk hunting would decrease in both the short and long term.

Impacts on Social Conditions

SOCIAL WELL-BEING

In the short term the social well-being of EIS area ranchers would be affected by this alternative. Since half of the ranchers would receive reductions in AUMs and half would receive increases, impacts would be mixed. The 42 families receiving reductions and resulting income losses would be adversely impacted. It is possible that the vegetation and subsequent income loss would be regained, depending upon future allocative decisions coming out of the BLM planning system. However, the possibility does exist that the vegetation would not be regained by all impacted ranches. Consequently, the income loss could be long-term for some individuals.

Some of these 89 families could also be adversely impacted if they were not able to remain in the range livestock business due to inability to sustain the vegetation losses, since the dependency on BLM administered vegetation of some ranches associated with these families is relatively critical. Some of these individuals could be adversely impacted as a result of the social and occupational dislocation which could result from the inability to survive the vegetation use reductions.

SOCIAL AND CULTURAL ATTITUDES

The BLM vegetation use reductions could conflict with aspirations held by the ranching community, since they would diminish the relative importance of what many in livestock ranching consider to be a justified land use. Those impacted by reductions could feel themselves deprived of opportunities to pursue what they consider to be a hard-working, independent existence.

Those livestock ranchers without reductions or with increases in the allocations could be expected to concur with the proposal, since it would enhance their use of public lands by providing what many of them consider to be needed range improvements.

Short-Term Uses vs. Long-Term Productivity--Optimize Livestock Grazing Alternative

In the long term, vegetation would improve from 14 percent (43,051 acres) in good condition to 64 percent (196,425 acres) in good and excellent condition; total production would increase from 518 to 780 pounds/acre/year; and cover would increase from 18 to 30 percent basal.

Short-term erosion would increase (from 929,129 to 1,090,693 ton/year); however, in the long term, erosion would be reduced (to 569,466 tons/year).

On areas of vegetation treatment, the short term average infiltration capacity would decrease by 8 percent (from 1.91 to 1.76 inches/hour) and surface runoff would increase (from 0.2510 to 0.2830 acre-feet/sq mi/6 month grazing season). In the long term these trends would reverse to some extent with infiltration at 2.44 inches/hour and surface runoff at 0.1046 acre-feet/sq mi/6 month grazing season. On areas without vegetation treatment, the short term average infiltration capacity and surface runoff would remain unchanged from present conditions. In the long-term, this alternative would show very little change from the present. The infiltration capacity would be reduced to 1.90 inches/hour and the surface runoff would increase to .2551 acre-feet/sq mi/6 month grazing season.

Compaction would remain unchanged in the short and long term on untreated areas, but would decrease by 28 percent on treated areas in the long term.

Both the short and long terms would see decreases in most big game species; elk (to 4,000 winter; 1,300 summer; 100 yearlong), mule deer (to 9,500 winter; 3,100 summer), pronghorn (to 100 yearlong), and bighorn sheep (to 80 winter; 90 summer; 60 yearlong). Mountain goats would remain stable at 25 winter.

In the long term, there would be a decrease by 30 miles of stream in excellent aquatic habitat condition and by 40 miles in good condition.

The short term vegetation allocation to livestock would be 61,356 AUMs. By the long term, this could increase to 92,389 AUMs.

Due to long term decreases in wildlife numbers, recreation days for elk hunting could be reduced by 25,245 and mule deer by 13,860 days in the long term. A decrease in fishing quality could also occur.

Gross revenue would be increased in the short term by $305,367 and in the long term by $2,216,089. Similar short and long term increases in net revenue would be $232,082 and $919,975, respectively.

The portion of rangeland improvement costs returned to EIS area households ($833,684) would be a short-term benefit. The portion of annual maintenance costs returned ($44,046) would be a long-term benefit.

Ranch values would increase by $336,000 in the short term and by $8,094,000 in the long term under this alternative. Also, the counties' tax base would increase by $16,800 in the short term and by $307,650 in the long term, and property tax revenues would increase by $1,157 in the short term and by $27,134 in the long term.

There could be short and long-term increases in the social well being of the affected operators.

Adverse Impacts--Optimize Livestock Grazing Alternative

The temporary increases in erosion, decreases in infiltration rates, and increases in surface runoff on treated areas would be adverse impacts.

The decreases in wildlife herds would be adverse impacts: elk by 4,500 winter, 1,400 summer, 100 yearlong; mule deer by 6,300 winter, 2,000 summer; pronghorn by 50 yearlong; and bighorn sheep by 40 winter, 50 summer, 30 yearlong.

the decreases in aquatic habitat (30 miles less excellent condition and 40 miles less good condition) would be adverse impacts.

The losses of wildlife recreation days (25,245 for elk and 13,860 for deer) would be adverse impacts.

Higher operating costs, more frequent visits, and more intensive management are expected to be experienced by range users.

SUPPORT DATA

LIST OF PREPARERS

LIST OF PREPARERS

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Team Leader	Lance Nimmo	BS Forestry University of Montana	8	All
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Economist	Lyle Johnson	BS Agricultural Economics Utah State University MS Agricultural Economics Utah State University	4	Social Conditions, Economics
Wildlife Biologist	Bruce Baker	BS Wildlife Science Texas A&M University Some Graduate School	3	Terrestrial Wildlife
Fisheries Biologist	Jeff Cameron	BA Biological Science California State University at Sacramento Some Graduate School Fisheries/Entomology	3	Aquatic Wildlife
Outdoor Recreation Planner	Alex Van Hemert	BS Park Management and Recreation Planning North Michigan University	2	Recreation, Wilderness
District Archeologist	Douglas Scott	Phd Anthropology University of Colorado	4	Cultural Resources
Soil Scientist	William Ypsilantis	BS Forest Management Michigan Technological University MS Forest/Soils University of Idaho	7	Soils, Minerals, Air Quality
Hydrologist	Dennis Murphy	BS Forest/Watershed Management Utah State University	1½	Hydrology, Climate
Botanist	Jim Ratzloff	BA Biology/Botany Metropolitan State College, Denver AA Life Science Chaffee Junior College	3	Forestry, Vegetation, T & E Plants
Landscape Architect	Johnn Sterzer	BA Landscape Architecture Utah State University	3	Visual Resources
Writer/Editor	Steven R. Till	BA Technical Journalism Colorado State University	3	All

LIST OF AGENCIES, ORGANIZATIONS AND PERSONS TO WHOM THE STATEMENT WAS SENT

LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM COPIES OF THE ENVIRONMENTAL IMPACT STATEMENT WERE SENT

Federal Agencies

- Advisory Council on Historic Preservation
- Department of Agriculture
  - Forest Service
  - Soil Conservation Service
- Department of Energy
- Department of the Interior
  - U.S. Fish and Wildlife Service
  - Water and Power Resource Service
  - Heritage Conservation and Recreation Service
  - Geological Survey
  - Bureau of Mines
  - National Park Service
- Environmental Protection Agency

State Agencies

- Governor's Clearing House--Colorado

Local Agencies

- County Commissioners
  - Gunnison County
  - Hinsdale County
  - San Juan County
  - Saguache County
  - Montrose County

Other Organizations and Individuals

- Sierra Club
- Colorado Open Space Council
- Izaak Walton League
- The Wildlife Society
- Colorado Cattlemen's Association
- Colorado Wool Grower's Association
- Audubon Society
- Natural Resources Defense Council
- Society for Range Management

Wilderness Society
Rocky Mountain Center on Environment
Trout Unlimited
Colorado Historical Society
Ada County Fish and Game League
Nevada Outdoor Recreation Association
Oregon Environmental Council
National Council of Public Land Users
All Livestock Grazing Permittees in the EIS Area
Various Individuals Who Have Requested Copies of
    All BLM Environmental Documents

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GLOSSARY

GLOSSARY

ACTIVE USE: Grazing privileges which have been paid for and are presently being used. Active use combined with nonuse equals total authorized livestock use. Active use normally is descriptive of federal grazing privileges.

ADJUDICATED GRAZING PRIVILEGES: That amount of forage production on a particular unit of federal range that is apportioned to range users following a formal process that includes application by the users for grazing privileges, determination of the qualifications for grazing privileges of the applicants, apportionment among applicants of the forage production within the proper grazing season and capacity of that unit of federal range, and acceptance by the applicants of the grazing privileges based upon the apportionment or its substantiation in a decision by an examiner or the Board of Land Appeals upon appeal.

ADVERSE (VISUAL) IMPACT: Any impact on the vegetation, land form, or any introduction of a structure which interrupts or adversely changes the visual character of the landscape and disrupts the harmony of the natural elements.

ALLOCATION: The actual number of animals, expressed in either animal units, animal unit months, on a specific area at a specific time. Synonyms: stocking rate, grazing rate.

ALLOTMENT: An area of land where one or more individuals graze their livestock. It generally consists of public lands but may include parcels of private or state owned lands. The number of livestock and season of use are stipulated for each allotment. An allotment may consist of several pastures.

ALLOTMENT MANAGEMENT PLAN (AMP): A specific plan for a given area (allotment) which uses a system of livestock use to achieve set vegetative, watershed, soil, wildlife habitat and/or recreational objectives.

ANIMAL UNIT: Considered to be one mature (1,000 lb.) cow or equivalent based upon average daily forage consumption of 26 lbs. dry matter per day.

ANIMAL UNIT MONTH (AUM): The amount of forage one cow with calf or five sheep require in one month.

ANNUAL PRODUCTION: The yearly total production of shrubs, grasses, and forbs in a given area. In the EIS annual production is expressed in term of total dry pounds per acre.

BASE FLOW: Stream flow derived from ground-water discharge into the waterway.

BROWSE: The part of current leaf and twig growth of shrubs, woody vines, and trees available for animal consumption.

BROWSE LINE: A well-defined height to which browse has been removed by animals.

BUNCH GRASS: A grass so-called because of its characteristic growth habit of forming a bunch or tuft.

CANOPY: The vertical projection downward of the aerial portion of plants (usually shrubs or trees).

CARBOHYDRATES: Any of a number of compounds containing carbon, hydrogen or oxygen, sugar or starch. The reserve material in plants consists largely of carbohydrates.

CARBOHYDRATE RESERVES: The food storage material in plants which consist largely of carbohydrates. Low carbohydrate reserve levels as the plant enters dormancy is indicative of low vigor in the plant carbohydrate reserves. Serves as a source of energy for plant functions at all times.

CARRYING CAPACITY: See Grazing Capacity.

CHARACTERISTIC LANDSCAPE: The established landscape within an area being viewed. This does not necessarily mean a naturalistic character. It could refer to a farming community, an urban landscape or an undisturbed natural environment.

CLIMAX: The highest ecological development of a plant community capable of perpetuation under the prevailing climatic and edaphic conditions.

CLIPPING: Harvesting vegetation to stimulate grazing effects. Clipping is done in many research studies in which the response of plants to defoliation is examined.

COMPLIANCE STATEMENT, 106: Under the Historic Preservation Act of 1966, the Advisory Council on Historic Preservation must be given an opportunity to comment with regard to any action which may affect any site on or eligible for inclusion on the National Register. If the undertaking causes a change in the quality of the character of the site, then the Advisory Council and State Liaison Officer would consult with the agency to either remove or mitigate the effect.

COMPOSITION: The relative proportions of various plant species of the total live vegetative cover on a given area. It may be expressed in terms of cover, density, weight, etc.

CONDITION: See Range Condition.

CONTINUOUS GRAZING: Allowing domestic livestock to graze a specific area throughout the grazing season. The term is not synonymous with yearlong grazing in the Gunnison EIS area.

CONTRAST: The effect of a striking difference in the form, line, color, or texture of an area being viewed.

COOPERATIVE AGREEMENT: An agreement issued by BLM in conjunction with the construction of a project on public lands: Both the licensee and BLM have an interest in the project with the government retaining ownership of the project. This agreement also spells out who will maintain the project.

COVER: In this EIS cover refers to either basal cover or canopy cover. Basal cover is the proportion of the ground surface occupied by the stem bases (the rooted portion) of the plant. Canopy cover is the proportion of the ground surface under live aerial parts of plants. Cover may also refer to shelter and protection for animals and birds.

DECREASER SPECIES: Plants of a range site's original vegetation that will decrease in numbers with continued overuse.

DEFERRED ROTATION GRAZING: Discontinuance of grazing on various parts of a range in succeeding years, allowing each part to rest successively during the growing season to permit seed production, establishment of seedlings, or restoration of plant vigor. Two, but usually three or more, separate units are required. Control is usually insured by unit fencing, but may be obtained by camp unit herding.

DEPRESSION STORAGE: Represents the water collected into pools and depressions shortly after rainfall or snowmelt.

DETENTION STORAGE: Temporary storage; storage effect due to surface runoff in transit.

DOMINANT SPECIES: The major constituent of a plant or animal community.

EROSION: The wearing away of the land surface by running water, wind, ice, or other geologic agents, including such processes as gravitational creep. The following terms are used to describe different types of water erosion:

Accelerated Erosion -- Erosion much more rapid than natural (geologic) erosion, primarily as a result of the influence of man, or in some cases, of animals.

Gully Erosion -- The erosion process whereby water accumulates in narrow channels and, over short periods, removes the soil from this narrow area to considerable depths, ranging from 1.5 feet to as much as 75 to 90 feet.

Natural Erosion -- Wearing away of the earth's surface by water, ice, or other natural environmental conditions of climate, vegetation, etc., undisturbed by man. Synonymous with geological erosion.

Rill Erosion -- An erosion process in which numerous small channels of only several centimeters in depth are formed.

Sheet Erosion -- The removal of soil more less uniformly from every part of the slope.

EXCELLENT RANGE CONDITION: Rangeland in which 76-100 percent of the present vegetation is of the same kind as the potential plant community.

EXCHANGE-OF-USE: An agreement between the Bureau of Land Management and an applicant having ownership or control of non-federal land which is interspersed and normally grazed in conjunction with the surrounding federal range. The applicant would be allowed to graze the non-federal land without payment provided that during the length of the agreement, the Bureau has control and management of the non-federal land for grazing purposes. An exchange-of-use agreement is valid only when the non-federal land offered for exchange-of-use is located within the federal grazing allotment for which the exchange is sought.

EXCLOSURE: An area fenced to exclude animals.

FAIR RANGE CONDITION: Rangeland in which 26-50 percent of the present vegetation is of the same kind as the potential plant community.

FECAL COLIFORMS: A group of bacteria used as an indicator of sanitary quality in water. The total coliform group is an indicator of sanitary significance because the organisms are normally present in large numbers in the intestinal tracts of humans and other warm-blooded animals.

FORAGE: All browse and herbaceous food that is available to livestock or game animals.

GOOD RANGE CONDITION: Rangeland in which 51-75 percent of the present vegetation is of the same kind as the potential plant community.

GRASSLIKE PLANT: A member of the Cyperaceae or Juncaceae families which vegetatively resembles a true grass of the Gramineae family.

GRAZING CAPACITY: The maximum stocking rate possible without inducing damage to vegetation or related resources.

GRAZING SYSTEM: The manipulation of livestock grazing to accomplish a desired result. In the EIS includes rest/season of use and range improvements. Range improvements (fences, watering facilities, etc.) are needed to implement the grazing system.

HABITAT: The total environmental conditions of a specific place or area that is occupied by an organism, a population, or a community. Some elements of habitat are food, cover, water, and space.

HEADWARD EROSION: Head erosion; headwater erosion. A valley is lengthened at its upper end and is cut back by the water which flows in at its head, the direction being determined by the greatest column of water which enters it.

HUMMOCK: A small mound often referred to as an indicator of erosion. The soil has eroded from between individual plants, leaving the plants on small hillocks. Hummocking may also occur as a result of compaction of moist soil (see Figure R4-3).

INCREASER SPECIES: Plants of a range site's original vegetation that will increase in numbers, at least for a time, when the site is overused.

INFILTRATION CAPACITY: The infiltration rate that becomes relatively constant after the soil profile has become wetted.

INFILTRATION RATE: That rate at which water passes through the soil-air interface.

INTENSIVE MANAGEMENT: Grazing management under an allotment management plan.

INTERCEPTION STORAGE: The amount of water or snow held by living and dead plant material at any given time.

INTERFLOW: That part of precipitation which infiltrates into the soil to a relatively impermeable layer, and as a result spreads out and flows laterally a short distance below the soil surface to the stream.

INTERMITTENT STREAM: A stream that flows for at least one month of the calendar year as a result of ground-water discharge or surface runoff.

INTRODUCED SPECIES: A species not a part of the original fauna or flora of the area in question.

INVADER: Plant species that were absent or present in very small amounts in undisturbed portions of the original vegetation of a specific range site and will invade following disturbance or continued overuse.

KEY FORAGE SPECIES: Relatively or potentially abundant, endures moderately close grazing, and serves as an indicator of changes occurring in the vegetional complex. This species is an important vegetal component that, if overused, will have significant effect on watershed condition, grazing capacity, or other resource values. Other forage species having growth requirements equal to or less than the key species will be maintained by the rest from grazing.

KIND OF LIVESTOCK: Cattle, sheep, or horses.

KRUMMHOLTZ: The twisted, contorted subalpine fir and Engelmann spruce at timberline.

LANDSCAPE CHARACTER: The arrangement of a particular landscape by the four basic elements of form, line, color, and texture, and the variety it portrays.

LICENSED USE: The combined authorized active and nonuse grazing use of federal grazing by a livestock operator. This does not include unauthorized (trespass) use.

MANAGEMENT FRAMEWORK PLAN (MFP): Land use plan for public lands which provides a set of goals, objectives, and constraints for a specific planning area to guide the development of detailed plans for the management of each resource.

MULTIPLE USE: Harmonious and coordinated management of the various surface and subsurface resources, without impairment of the land, that will best meet the present and future needs of the people.

NATIONAL REGISTER OF HISTORIC PLACES: Established by the Historic Preservation Act of 1966. The Register is a listing of archeological, historical, and architectural sites nominated for their local, state, or national significance by the state and federal agencies and approved by the Register staff.

NATURALISTIC ENVIRONMENT OR LANDSCAPE: A landscape situation where the basic elements (form, line, color, and texture) are displayed in a composition that appears natural within the surrounding area or character type.

NITROTOXINS: Toxic compounds which are characterized by the presence of nitrogon, and made by the action of nitric or nitrous acid. In the EIS nitrotoxin is used to describe poisonous substances in *Astragalus* species.

NON-INTENSIVE MANAGEMENT: Continuous grazing in an area where no AMP exists.

NONUSE: Grazing privileges which are not presently being used. The nonuse combined wtih the active use (see active use) equals the total authorized livestock use. Nonuse normally is descriptive of federal grazing privileges.

OVERGRAZED RANGE: A range that has deteriorated and may still be deteriorating from its productive potential due to continued overuse.

OVERLAP: That portion of AUMs which are available to big game and livestock.

OVERSTORY: The uppermost crown of plants. Usually refers to trees, tall shrubs, and vines.

OVERUTILIZATION: Utilizing an excessive amount of the current year's growth, which if continued, will result in range deterioration or overgrazing.

PALATABILITY: The relish that an animal shows for a particular species, plant, or plant part.

PASTURE: A grazing area enclosed and separated from other areas by fence.

PERENNIAL STREAM: Streams that flow throughout the year and from source to mouth.

PERIOD OF USE: The times of the year when domestic animals would be allowed to graze on a specific unit of range, as designated by license.

PHENOLOGY: The annual stage of development of a plant, such as: greenup, flowering, seed ripe, seed dissemination, and dormancy.

PHENOLOGICAL NEEDS OF PLANTS: Requirements of vegetation to survive, the need to manufacture food, to replenish food reserves, to produce viable seed, and to have new seedlings become established.

PHOTOSYNTHESIS: The process in plants of converting light energy, carbon dioxide, and water into organic compounds, chiefly sugars.

PLANNING UNIT: A geographic unit within a Bureau of Land Management district which includes related lands, resources, and use pressure problems which are considered together for resource inventory and planning.

POISONOUS PLANTS: A plant containing or producing substances that cause sickness, death, or a deviation from normal state of health of animals.

POOR RANGE CONDITION: Rangeland in which 0-25 percent of the present vegetation is of the same kind as the potential plant community.

PREFERABLE SPECIES: Species that are preferred by animals and are grazed by first choice.

PROPER USE FACTOR (PUF): A degree and time of use of current year's growth which, if continued, will either maintain or improve the range condition consistent with conservation of other natural resources.

PUBLIC LANDS: Historically, the public domain administered by the Bureau of Land Management for the purpose of providing forage, wood products, and minerals for public users. The uses and resources of these public lands have been expanded in recent years to provide open space, wildlife habitat, recreation resources, protection of cultural resources, and other commodities.

QUIESCENCE: Plant dormancy/Anthesis--peak flowering in plants.

RANGE CONDITION: The state and health of the range based on what the range is naturally capable of producing.

RANGE IMPROVEMENT: A structure or practice that increases forage production, improves watershed and range conditions, or facilitates management of the livestock grazing thereon.

RANGE SITE: An area of land having a combination of edaphic, climatic, topographic, and other natural factors that is significantly different from adjacent areas. These environmental areas are considered as units for purposes of discussion, investigation, and management.

RANGE SUITABILITY: The adaptability of a range to grazing by livestock and/or big game.

RANGE TREND, APPARENT: The direction of apparent change in a range condition class. Trend is rated as being in an upward, downward, or static position.

REST ROTATION GRAZING: An intensive system of management whereby grazing is deferred on various parts of the range during succeeding years, allowing the deferred part complete rest for one year. Two or more units are required. Control by fencing is usually necessary on cattle range, but may be obtained by herding on sheep ranges.

RIPARIAN: Situated on or pertaining to the bank of a river, stream, or other body of water (normally used to refer to the plants of all types that grow along streams, around springs, etc.).

SEED RIPE STATE: When seed is mature, usually late summer and early fall.

SHRUB: A plant that has persistent, woody stems and a relatively low growth habit, and that generally produces several basal shoots instead of a single bole. It differs from a tree by its low stature and nonarborescent form.

SOIL ASSOCIATION: A landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil and it is named for the major soils.

SOIL LOSS TOLERANCE: The maximum rate of soil erosion that can occur without a long-term reduction in the productive capacity of the soil.

SPECIES COMPOSITION: The relative proportions of various plant species in the total cover on a given area. In the EIS it is expressed in terms of percent, by weight.

SUBLIMATION: The process by which water as a solid transforms directly to a gaseous state without becoming a liquid.

SURFACE RUNOFF: The runoff that travels over the soil surface to the nearest surface stream; runoff of a drainage basin that has not passed beneath the surface since precipitation.

TAC: Total available carbohydrates. A term used to measure carbohydrate concentration in plants.

TOTAL DISSOLVED SOLIDS: A measure of the mineral and organic material dissolved in water. It is usually determined by evaporating a filtered volume of water and weighing the residue. The amount of residue is expressed as a proportion of the original sample in parts per million or milligrams per liter (mg/1).

TRAILING USE: Controlled movement of livestock through or across public lands, usually from one grazing area to another (whether private, Forest Service, or other public). The livestock graze as they are trailed.

TRANSPIRATION: The emission of water vapor from the surface of an organism, such as that lost through leaves.

TREND: The direction of change in range condition and soil over time. Since the EIS trend data was gathered in one year, it is more adequately referred to as "apparent trend."

TRESPASS: The grazing of livestock on rangeland without proper authority and resulting from a willful or negligent act. Trespass includes any or all of the following: (1) Grazing an improper number of livestock; (2) grazing in the wrong areas of use, and (3) grazing at an unauthorized time of year.

TURBIDITY: This term has been used as an expression of the optical properties of a water sample which causes light rays to be scattered and absorbed rather than transmitted through the sample.

TURNOUT: Denotes the beginning of the grazing season.

UNDERSTORY: Plants growing beneath the canopy of another plant. Usually refers to grasses, forbs, and low shrubs under a tree or brush canopy. The opposite of overstory.

UNDESIRABLE SPECIES: Species that are not desirable because they are unpalatable or low in palatibility, injurious to animals, poisonous, poor stabilizers of soil and water, etc.

UNIT RESOURCE ANALYSIS (URA): A comprehensive display of physical resource data and an analysis of the current use, production, condition, and trend of the resources and the potentials and opportunities within a planning unit, including a profile of ecological values.

UNSUITABLE RANGE: An area which has no value for, or which should not be used by livestock because of steep topography, barrenness, dense timber, lack of forage, or unstable soils.

UTILIZATION: The proportion of current year's forage production that is consumed or destroyed by grazing animals.

VEGETATION TREATMENT: One of several methods of altering the species composition of the range vegetation to favor more desirable forage species. Herbicide spraying, burning, or mechanical treatment (plowing and seeding, rotobeating, etc.) are common vegetation treatment techniques. Woody species are often decreased and perennial grasses increased in vegetation treatments.

VEGETATION TYPE: A term used to differentiate vegetation. It generally refers to the species or various combinations of species which have similar stature, morphology, and appearance and dominate or appear to dominate a site, giving it a common appearance.

VIGOR: The relative health of a plant.

VISUAL RESOURCE: All features visible on public lands. Generally referred to as land, water, and vegetation.

APPENDIX RM-1

APPENDIX RM- 1

COMPARISON OF VEGETATION ALLOCATIONS FOR ALTERNATIVES (AUMS)

Allotment Number	Allotment Name	MFP/Spring Rest and Fall Rest Alternatives		No Action Alternative and Present Situation			Elimination Alternative		Optimize Wildlife/Watershed Alternative		Optimize Livestock Alternative		Totals for A-D-E
		LS *	WL *	LS	WL	Total	LS	WL	LS	WL	LS	WL	
5209	Gunnison River	0	35	16	54	70	0	35	0	35	9	26	35
6000	Soap Creek	1	2	10	2	12	0	2	1	2	2	1	3
6001	Goose Creek	280	398	374	493	867	0	483	195	483	401	277	678
6003	Veo	22	75	69	75	144	0	83	14	83	51	46	97
6004	Collins	13	47	24	47	71	0	54	6	54	38	22	60
6005	Soderquist	21	70	21	70	91	0	87	4	87	77	14	91
6006	Blue Mesa	47	16	47	16	63	0	31	32	31	53	10	63
6007	Blue Mesa	47	15	89	15	104	0	32	30	32	53	9	62
6008	Colorado-Utah	17	77	34	77	111	0	84	10	84	49	45	94
6009	Foughnier	3	0	14	0	14	0	1	2	1	3	0	3
6010	Willow Creek UMT	47	48	408	48	456	0	63	32	63	62	33	95
6011	Willow Creek	187	22	187	22	209	0	73	136	73	191	18	209
6013	Blythe	14	38	28	38	66	0	49	3	49	44	8	52
6014	Butte Creek	4	3	4	3	7	0	6	1	6	6	1	7
6015	Youmans	6	1	6	1	7	0	4	3	4	7	0	7
6016	Curecanti Sheep	25	98	111	102	213	0	110	13	110	72	51	123
6017	Newberry	15	1	15	1	16	0	5	11	5	15	1	16
6018	High Mesa	75	128	152	128	280	0	188	15	188	178	25	203
6019	Butte	0	6	18	6	24	0	6	0	6	5	1	6
6021	Cimarron Land	15	13	15	13	28	0	25	3	25	26	2	28
6022	Wilson	8	0	60	0	60	0	2	6	2	8	0	8
6024	Little Cimarron	8	70	92	70	162	0	76	2	76	64	14	78
6026	Soderquist	7	11	7	11	18	0	13	5	13	10	8	18
6027	Antholz	12	13	27	13	40	0	23	2	23	23	2	25
6029	Howell	9	10	27	10	37	0	17	2	17	17	2	19
6030	Masden	10	8	32	8	40	0	16	2	16	16	2	18
6031	Alpine Plateau	187	122	187	122	309	0	273	36	273	286	23	309
6032	Blue Mesa	206	224	206	224	430	0	375	55	375	371	59	430
6033	Willow Creek AMP	500	136	604	136	740	0	528	108	528	607	29	636
6034	Little Willow	101	52	168	46	214	0	83	70	83	122	31	153
6036	Blue Cimarron	8	1	11	1	12	0	3	6	3	8	1	9
6037	Windy Point	19	16	28	16	44	0	21	14	21	23	12	35

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* LS-Livestock, WL-Wildlife

APPENDIX RM-1

COMPARISON OF VEGETATION ALLOCATIONS FOR ALTERNATIVES (AUMS)
(continued)

Allotment Number	Allotment Name	MFP/Spring Rest and Fall Rest Alternatives LS *	WL *	No Action Alternative and Present Situation LS	WL	Total	Elimination Alternative LS	WL	Optimize Wildlife/Watershed Alternative LS	WL	Optimize Livestock Alternative LS	WL	Totals for A-D-E
6040	Butte Rock	31	24	31	24	55	0	49	6	49	50	5	55
6050	Maurer Blue Canyon	272	114	272	114	386	0	228	158	228	363	23	386
6051	Nicolas Big Blue	13	56	33	56	89	0	67	2	67	58	11	69
6052	Nicolas Big Park	16	96	86	96	182	0	109	3	109	93	19	112
6053	Cox Park	102	58	102	58	160	0	141	19	141	149	11	160
6054	Johnson Park	21	38	36	38	74	0	55	4	55	51	8	59
6055	Pine Crest	94	80	128	80	318	0	120	54	120	128	46	174
6056	Highway	62	109	155	109	264	0	134	37	134	102	69	171
6060	Gateview Unalloted	0	36	0	33	33	0	35	1	35	22	14	36
6061	Burke and Romer	52	4	52	4	56	0	46	10	46	55	1	56
6062	Stock Drive	0	71	0	71	71	0	71	0	71	55	16	71
6100	Ten Mile Spring	1,089	1,130	1,792	1,094	2,886	0	1,560	659	1,560	1,538	681	2,219
6101	Sapinero	684	570	684	568	1,252	0	752	502	752	835	419	1,254
6102	Powderhorn	347	384	347	384	731	0	467	264	467	477	254	731
6103	Indian Creek	800	774	1,350	762	2,112	0	1,023	551	1,023	1,041	533	1,574
6104	Powderhorn AMP	1,200	1,757	2,208	1,756	3,964	0	2,684	273	2,684	2,558	399	2,957
6105	Yeager Gulch	646	319	646	318	964	0	722	243	722	845	120	965
6106	Huntsman Mesa	104	38	189	38	227	0	88	54	88	122	20	142
6107	Iola-Powderhorn	9,383	4,823	10,841	5,112	15,953	0	11,869	2,337	11,869	13,005	1,201	14,206
6108	Park Creek	883	226	1,007	212	1,219	0	894	215	894	1,054	55	1,109
6109	Monuments	400	546	496	547	1,043	0	831	115	831	789	157	946
6111	Cathedral	238	250	315	236	551	0	397	91	397	392	96	488
6112	Cebolla Creek	327	399	476	377	853	0	556	170	556	519	207	726
6113	Mineral Creek	5	8	14	5	19	0	9	4	9	7	6	13
6114	Horseshoe	11	19	20	17	37	0	16	14	16	21	9	30
6115	Devils Lake	538	465	530	465	995	0	787	216	787	816	187	1,003
6116	Ute Trail	37	64	76	64	140	0	93	8	93	87	14	101
6117	Lone Pine	56	47	174	47	221	0	68	35	68	74	29	103
6120	Red Ride	64	31	118	31	149	0	50	45	50	83	12	95
6123	Fourth of July	9	4	9	5	14	0	11	2	11	12	1	13
6125	J.S. Ward	8	2	8	2	10	0	8	2	8	10	0	10
6127	Lake Fork	44	87	70	87	157	0	119	12	119	107	24	131
6128	Friends Creek	118	56	120	56	176	0	133	41	133	154	20	174
6129	Waterdog Lake	10	4	10	4	14	0	12	2	12	13	1	14

APPENDIX RM-1

COMPARISON OF VEGETATION ALLOCATIONS FOR ALTERNATIVES (AUMS)
(continued)

Allotment Number	Allotment Name	MFP/Spring Rest and Fall Rest Alternatives		No Action Alternative and Present Situation			Elimination Alternative		Optimize Wildlife/Watershed Alternative		Optimize Livestock Alternative		Totals for A-D-E
		LS *	WL *	LS	WL	Total	LS	WL	LS	WL	LS	WL	
6130	Campbell Creek	5	5	9	5	14	0	9	1	9	9	1	10
6131	Hells Canyon	32	36	74	36	110	0	62	6	62	61	7	68
6132	Ranch Pasture	5	1	6	1	7	0	3	3	3	5	1	6
6133	Lake Fork Unallotted	0	42	0	42	42	0	42	0	42	33	9	42
6134	Elk Pasture Unallotted	0	386	0	386	386	0	386	0	386	308	78	386
6150	Round Mountain	17	20	23	20	43	0	26	11	26	24	13	37
6180	Rock Creek	58	63	73	45	118	0	104	17	104	102	19	121
6200	Dillon Mesa	114	282	168	288	456	0	313	83	313	191	205	396
6201	Oswald	5	11	21	15	36	0	12	4	12	8	8	16
6202	Stevens Creek	607	1,113	762	1,574	2,336	0	1,302	418	1,302	953	767	1,720
6203	Beaver Creek	538	608	673	723	1,396	0	811	335	811	767	379	1,146
6204	Stuben Creek	20	45	49	51	100	0	49	16	49	36	29	65
6205	Spann	4	4	8	5	13	0	5	3	5	5	3	8
6206	Blinberry Gulch	144	190	180	284	464	0	227	107	227	193	141	334
6207	West Antelope	60	42	85	65	150	0	73	29	73	82	20	102
6208	West Antelope Creek	271	190	489	302	791	0	250	211	250	340	121	461
6210	Antelope Creek	20	41	27	56	83	0	47	14	47	32	29	61
6212	Towner	46	239	46	278	324	0	261	24	261	158	127	285
6213	Mill Creek	73	341	166	396	562	0	361	53	361	189	225	414
6215	West Side Unallotted	0	35	0	47	47	0	35	0	35	19	16	35
6216	Antelope Creek	109	255	225	302	527	0	292	72	292	198	166	364
6217	Harris Exchange of Use	44	130	77	151	228	0	145	29	145	95	79	174
6250	Wildlife Land	0	446	0	567	567	0	446	0	446	142	304	446
6251	Robbins Exchange of Use	6	17	6	26	32	0	19	4	19	10	13	23
6300	Sheeps Gulch	944	1,100	1,111	1,427	2,538	0	1,361	683	1,361	1,246	798	2,044
6301	Cabin Creek	1,118	1,104	1,613	1,429	3,042	0	1,421	801	1,421	1,431	791	2,222
6302	Alder Creek	1,200	1,085	1,740	1,085	2,825	0	1,405	880	1,405	1,490	795	2,285
6303	Line Spring	63	104	100	104	204	0	122	45	122	92	75	167
6304	Doyleville Group	286	383	392	383	775	0	459	210	459	361	308	669
6305	Woods Gulch	469	500	469	500	969	0	602	367	602	602	367	969

APPENDIX RM-1

COMPARISON OF VEGETATION ALLOCATIONS FOR ALTERNATIVES (AUMS)
(continued)

Allotment Number	Allotment Name	MFP/Spring Rest and Fall Rest Alternatives LS *	WL *	No Action Alternative and Present Situation LS	WL	Total	Elimination Alternative LS	WL	Optimize Wildlife/Watershed Alternative LS	WL	Optimize Livestock Alternative LS	WL	Totals for A-D-E
6306	Waunita Hot Springs	31	19	44	19	63	0	28	22	28	36	14	50
6307	Taylor Park	26	5	26	5	31	0	12	19	12	27	4	31
6308	Hot Springs	60	37	106	37	143	0	53	44	53	70	27	97
6309	Tomichi Dome	248	124	248	124	372	0	195	177	195	284	88	372
6310	Pleasant View	44	78	62	78	140	0	89	33	89	64	58	122
6311	Gold Basin	2,000	369	4,817	369	5,186	0	933	1,436	933	2,104	265	2,369
6312	Lower Cochetopa	1,818	593	1,818	593	2,411	0	1,089	1,322	1,089	1,976	435	2,411
6313	Stubbs Gulch	892	311	892	311	1,203	0	754	449	754	1,046	157	1,203
6314	Holly-Cochran	35	11	64	11	75	0	20	26	20	38	8	46
6315	Upper Means	121	106	184	107	291	0	169	58	169	177	50	227
6316	Bead Creek	318	117	440	126	566	0	244	191	244	365	70	435
6317	South Parlin Flats	622	715	946	737	1,683	0	890	447	890	824	513	1,337
6318	Camp Kettle	800	718	977	762	1,739	0	944	574	944	1,002	516	1,518
6320	Big Draw	100	139	147	135	282	0	165	74	165	136	103	239
6323	Barrett Creek	83	395	135	394	529	0	417	61	417	186	292	478
6324	Hoover	14	23	22	23	45	0	27	10	27	20	17	37
6325	Mill Hill	105	184	137	184	321	0	211	78	211	153	136	289
6326	Snyder Gulch	53	115	80	117	197	0	129	39	129	83	85	168
6327	Vouga Reservoir	108	282	200	282	482	0	327	63	327	227	163	390
6328	Rock Creek	445	179	324	176	500	0	400	224	400	534	90	624
6329	West Pass Creek	892	704	1,128	721	1,849	0	1,075	521	1,075	1,184	412	1,596
6338	Muddy-Poison	120	58	120	58	178	0	122	56	122	151	27	178
6339	Gould	14	10	23	14	37	0	14	10	14	17	7	24
6342	Dome	178	135	284	117	401	0	213	100	213	237	76	313
6343	Poison Gulch	308	115	456	101	557	0	254	169	254	360	63	423
6344	Trail Creek	172	100	332	100	432	0	191	81	191	225	47	272
6346	Cochetopa Creek	50	27	50	25	75	0	40	37	40	57	20	77
6347	Monchego A	216	28	619	14	633	0	106	138	106	226	18	244
6348	Texas Creek	108	48	194	37	231	0	76	80	76	120	36	156
6349	Mesa	10	4	10	3	13	0	7	7	7	11	3	14
6350	Van Tassel	115	22	164	11	175	0	58	79	58	122	15	137
6352	Hoyt	10	0	10	0	10	0	8	2	8	10	0	10
6353	Lower Means	113	29	138	29	167	0	88	54	88	128	14	142

APPENDIX RM-1

COMPARISON OF VEGETATION ALLOCATIONS FOR ALTERNATIVES (AUMS)
(continued)

Allotment Number	Allotment Name	MFP/Spring Rest and Fall Rest Alternatives		No Action Alternative and Present Situation			Elimination Alternative		Optimize Wildlife/Watershed Alternative		Optimize Livestock Alternative		Totals for A-D-E
		LS *	WL *	LS	WL	Total	LS	WL	LS	WL	LS	WL	
6354	Vouga Reservoir Exchange	Combined with Allotment 6327											
6355	Mill Ranches Unallotted	0	8	0	7	7	0	8	0	8	2	6	8
6356	Doyleville Road	Combined with Allotment 6329											
6357	Meaker	Combined with Allotment 6329											
6358	Doyleville	Combined with Allotment 6999											
6359	Baxter	26	24	90	28	118	0	31	19	31	32	18	50
6360	Big Draw	23	30	38	32	70	0	33	20	33	31	22	53
6361	Manchego	Combined with Allotment 6347											
6362	Cold Springs	118	29	168	29	197	0	103	44	103	136	11	147
6363	Coleman Exchange of Use	28	7	28	6	34	0	14	21	14	30	5	35
6364	Willis Exchange of Use	17	7	17	11	28	0	11	13	11	19	5	24
6365	Barrett Creek	8	21	12	24	36	0	23	6	23	13	16	29
6366	Hot Springs	Combined with Allotment 6308											
6367	Piloni Exchange of Use	4	2	4	2	6	0	3	3	3	5	1	6
6368	Hann Unallotted	0	4	0	4	4	0	4	0	4	1	3	4
6369	Dry Creek	Combined with Allotment 6329											
6370	Archuleta	Combined with Allotment 6329											
6371	Shearing Plant	Combined with Allotment 6329											
6372	Alkali Creek	Combined with Allotment 6328											
6373	South Homestead	Combined with Allotment 6329											
6374	Reservoir	Combined with Allotment 6344											
6375	Shearing Plant	Combined with Allotment 6329											
6400	Jacks Cabin	8	94	38	94	132	0	96	6	96	32	70	102
6401	Flat Top	44	362	108	362	470	0	373	33	373	138	268	406
6402	Slate River	11	21	39	21	60	0	24	8	24	17	15	32
6999	Sargents Unallotted	41	53	21	40	61	0	71	23	71	64	30	94
6500	Wade Gulch	279	922	528	922	1,450	0	992	209	992	510	691	1,201
6501	Ramboulet Park	46	61	43	61	104	0	99	8	99	96	11	107
6502	Red Cloud	868	515	868	494	1,362	0	1,276	107	1,276	1,311	72	1,383
6503	Porter	238	232	242	216	458	0	380	90	380	382	88	470
6504	Hanson Creek	486	130	486	134	620	0	441	175	441	569	47	616
6505	Chuchuru Brother	1,200	391	1,595	327	1,922	0	1,207	384	1,207	1,466	125	1,591

APPENDIX RM-1

COMPARISON OF VEGETATION ALLOCATIONS FOR ALTERNATIVES (AUMS) (continued)

Allotment Number	Allotment Name	MFP/Spring Rest and Fall Rest Alternatives		No Action Alternative and Present Situation			Elimination Alternative		Optimize Wildlife/Watershed Alternative		Optimize Livestock Alternative		Totals for A-D-E
		LS *	WL *	LS	WL	Total	LS	WL	LS	WL	LS	WL	
6506	Burrough Park	678	342	678	324	1,002	0	783	237	783	900	120	1,020
6507	American Flats	267	2	267	1	268	0	79	190	79	269	0	269
6508	Mill Gulch	65	132	65	123	188	0	182	15	182	146	51	197
6509	American Lake	550	16	905	12	917	0	363	203	363	560	6	566
6510	Poughkeepsie	216	93	249	93	342	0	231	78	231	276	33	309
8900	Cement Creek	350	71	517	71	588	0	347	74	347	406	15	421
8901	Gladstone	354	66	354	66	420	0	328	92	328	403	17	420
8902	Eureka	800	103	900	103	1,003	0	663	240	663	872	31	903
8903	Price Brothers	202	96	202	96	298	0	272	26	272	286	12	298
8904	Silver Lake	0	17	0	17	17	0	17	0	17	0	17	17
8905	Cunningham Gulch	188	9	188	9	197	0	150	47	150	195	2	197
8906	Molas Lake	312	29	312	29	341	0	257	84	257	331	10	341
8907	Deer Park	264	251	348	251	599	0	436	79	436	442	73	515
8908	American Basin	300	0	399	--	399	0	225	75	225	300	0	300
8909	Minnie Gulch	196	118	196	111	307	0	282	32	282	296	18	314
8910	Elk Creek	0	2	433	0	433	0	2	0	2	2	0	2
8911	Maggie Gulch	290	70	290	66	356	0	331	29	331	353	7	360
Unallotted American Flats		0	807	0	804	804	0	807	0	807	501	306	807
	TOTALS	44,542	34,200	60,013	36,141	96,154	0	57,997	20,745	57,997	61,356	17,386	78,742

APPENDIX RM-2

APPENDIX RM-2

METHODOLOGY FOR DETERMINING LIVESTOCK VEGETATION ALLOCATIONS AND STOCKING RATES

RECOMMENDED ALLOCATION OF PRESENT VEGETATION

Present available forage production has been estimated based on best professional judgement using all available information including:

1. Ecological condition and apparent trend data gathered in 1978 (Soil Conservation Service Ecological Site Inventory Method),
2. Actual use,
3. Utilization,
4. Recomputed range survey,
5. Allotment inspections by range management personnel, wildlife biologists, botanists, soil scientists, hydrologists, and fishery biologists, and,
6. Personal contact with range users and other members of the general public.

Individual items mentioned above are discussed in detail by item.

Ecological Condition and Trend

Range Condition

The purpose of determining range condition is to measure any deterioration that has taken place and to provide a basis for predicting the degree of improvement possible. Range condition was determined by first mapping the various range sites and then listing the relative quantities of plants within each range site. A range site is a distinctive kind of range that has a certain potential for producing range plants. Each site has its own combination of environmental conditions and characteristic plant community. The range site retains its ability to produce this potential plant community unless it is materially altered or the environment changes. Annual production, the relative amount produced by each species, was estimated to the nearest percent. This was compared with the potential, or original, plant community of the same range site by using Techical Guides (see Example RM-2.1) developed by the Soil Conservation Service (SCS). The original or climax plant community for a range site is found by searching for protected or relatively undisturbed rangeland.

The degree to which the present plant community varies from the potential plant community is described by four classes. A range is in excellent condition if 76 to 100 percent of the present vegetation is of the same kind as the potential plant community. It is in good condition if the percentage is 51 to 75, in fair condition if the percentage is 26 to 50, and in poor condition if the percentage is less than 25.

To determine range condition, or the degree to which the present plant composition has departed from that of the native potential plant community, an estimate is made of the relative production, by weight, of the species that make up the plant community (see Example RM-2.2). For detailed information on range site descriptions and locations see Soil Survey of Gunnison Area, Colorado, August 1975.

Apparent Trend

Apparent range trend was conducted concurrently with the range condition survey. Long-term trend information is lacking on most of the EIS Unit. However, good data are available on allotments with AMPs. Apparent trend was collected using SCS form number CO-Range-6 (Example RM-2.3).

Utilization

Utilization, or the amount of annual forage consumed, is measured by standard Bureau Manual methods (Example RM-2.4).

Actual Use

Actual livestock forage consumption is reported by individual range users at the end of the grazing year. Bureau field personnel run actual use checks throughout the grazing season and verify the actual use forms submitted by the livestock operators (see Example (RM-2.5).

EXAMPLE RM-2.1

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service, Colorado

Technical Guide
Section II E

RANGE SITE NO. 250
________ Field Office
August 1975

RANGE SITE DESCRIPTION

for

SUBALPINE LOAM

Land Resource Area: Southern Rocky Mountains (48)

Native (potential) Vegetation and Guide for Determining Range Condition.

Percentage composition by weight of the principal species may total as much as:

Thurber fescue	50)	
Parry oatgrass	30)	Total of 60%
Idaho fescue	10	
Big bluegrass	10	
Arizona fescue	10	
Columbia and Letterman needlegrass	10	
Slender wheatgrass	5	
Nodding brome	5	
Western wheatgrass	5	
Snowberry	5	
Aspen fleabane	5)	
Lupine	5)	
Penstemon	5)	
Ligusticum	5)	Total of 15%
Geranium	2)	
Herbaceous cinquefoils	2)	
Meadow rue	2)	
Pale paintbrush	2)	
Yarrow	2)	
Others (as listed above)	15	

Tree species commonly associated with the site and often seen on small inclusions are Engelmann spruce and aspen. Approximate ground cover is 50%.

Species most likely to invade the site or increase from trace amounts are Kentucky bluegrass, dandelion, Douglas knotweed, Douglas rabbitbrush, pussytoes, and annual forbs. In some places aspen may invade.

As the ecological condition deteriorates, Thurber fescue and most associated grasses decline and some may eventually disappear. Some of the invaders listed above then become prominent, and there may be substantial increases in lupine, orange sneezeweed, cinquefoils, yarrow, mules-ear wyethia, trailing fleabane, fringed sage, or snowberry. In some places big or silver sagebrush become dominant. Kentucky bluegrass, Letterman needlegrass, or sheep fescue usually become the main grasses as deterioration continues. (Under sheep use, Thurber fescue may hold its own or increase for a time while may forbs decrease.)

Total Annual Production

Favorable years	3500	Pounds per Acre Air Dry
Unfavorable years	2000	" " " " "
Median years	2800	" " " " "

CO-RANGE-6'
(File Code No. Range-18)
7/75

EXAMPLE RM-2.2

Department of Agriculture
Soil Conservation Service
SCHRACK - COCHRAN
Conservationist
7/27/28
Date

RANGE CONDITION INVENTORY

RANGE SITE SUBALPINE LOAM SOIL UNIT PWE

LAND UNIT 6107-4 LOCATION OF INVENTORY T46N R1W S6 SW1/4

VEGETATION

List of Plant Species (Grasses, forbs and shrubs)											Total Wet Wt.	Total Dry Wt.	% Comp. By Wt	Percent in potential plant community
POFE	2	7	3	6		6	2	3	5	2	36	21.6	7	6
FEAR	10	4	8	12	4	6	4	5	12	15	80	48	14	10
SIHY						2	1	1	—	—	4	2.6	1	1
KOCR			3	3	7	2	1	1		5	22	9.9	3	3
STLE		2			2	1	5	5	7	5	22	13.2	4	4
ARNO		4									4	3	1	1
ARABIS										1	1	.6	T	T
UNKNOWN FORBS	8				1	1		2	2		14	5.2	1	1
LUPINUS												0		
CASTILLEJA									7		7	2.8	1	1
MERT	3					3	5			1	12	4.8	1	1
VIAM			4			30	6	8			48	19.2	5	1
TARAXACUM												0		
CARO	3				4			1			8	3.2	1	1
HYRI	3	1						1	15		20	8	2	2
ALLIUM						4					4	1.6	T	
ERIOGONUM		2						2	1		5	2	1	1
SEDUM	1										1	.35	T	
CREPIS						4			2		6	2.4	1	
SYOC				3	1						4	1.4	T	
CHUI						7		1		1	9	4.5	1	1
ARTR	20	44	24	26	30	28	34	30	24	32	292	200.8	56	2
ARFR									2		2	.8		
Totals												356	100	

Range Condition * 356 Percent 36%
POOR

Ground Cover:** B/C = 20/22 %. Total Annual Yield 317 lbs./ac. air dry

Description of Growing Season (amount of precipitation and distribution)

Comments: Use, availability, and other significant factors SOUTHWEST ASPECT, <10% SLOPE, ROCKY, BIG GAME USE - LIGHT, ELK PELLETS

* Condition may be lowered one condition class from Excellent, Good or Fair when total annual yield is significantly (25%) below the site's potential). CONDITION LOWERED ONE CLASS DUE TO POOR OR LOW PRODUCTION

** BASAL/CANOPY

EXAMPLE RM-2.3

GUIDE FOR RATING RANGE TREND

Considering the potential for this site, class of livestock, season of use, recreational use, fire, and other influences, rate the following by giving each item a rating of 4 to 0. Interpolate between indicators for ratings 3, 2, and 1.

# 6107-4

Trend Indicators

REPRODUCTION:

Major species of the potential plant community are producing seedlings, plants are of mixed ages; there is evidence of active tillers, rhizomes, stolons .... (4)

Major species not reproducing .... (0) 3

PLANTS RESIDUE AND CURRENT UTILIZATION:

Litter produced by major species is abundant for the site and current utilization is moderate .... (4)

Litter is absent and utilization is severe .... (0) 2

COMPOSITION CHANGES:

Dominant species of the potential plant community are maintaining their place in the stand .... (4)

Dominant species are absent or noticeably decreasing in percentage, while minor species and species not native to the community are increasing .... (0) 1

PLANT VIGOR:

Major species of the potential plant community are strong, healthy, productive and well rooted .... (4)

Major species are showing noticeable die-off .... (0) 2

SOIL SURFACE FACTORS:

Accelerated soil erosion is not evident. Past erosion signs have healed. Water intake for the kind of soil is favorable.. (4)

Accelerated erosion is obvious. Soil stability is poor as seen by failure of erosion signs to be healing. Water intake for the kind of soil is unfavorable .... (0) 2

Ratings between 11 and 20 inclusive = Improving Trend ______

Ratings between 0 and 10 inclusive = Declining Trend * 10

NOTES * Ratings between 13 - 20 = Improving Trend ______

Ratings between 9 - 12 = Static Trend 10

Ratings between 0 - 8 = Declining Trend ______

6107

EXAMPLE RM-2.4

Form 4412–12
(April 1966)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

RANGE UTILIZATION
KEY FORAGE PLANT METHOD

District Montrose	Date 10/18/78	Examiner Dave Arthur
Planning Unit	Allotment 6107- [illegible]	Pasture [illegible]
Vegetation Type	Class of Stock Cattle	
Season of Use	Grazing Management System	

Transect Location Drove Road & walked around

CLASS		KEY SPECIES					
INTERVAL	INTERVAL MIDPOINT (x)	Species Stipa spp.		Species Fescue spp.		Species Agropyron spp.	
		FREQUENCY (f)	(f) × (x)	FREQUENCY (f)	(f) × (x)	FREQUENCY (f)	(f) × (x)
Slight 0 – 20	10	//	20	//	20	//	20
Light 21 – 40	30	////	120	𝍸	150	////	120
Moderate 41 – 60	50						
Heavy 61 – 80	70	///	210	///	210	////	280
Severe 81 – 100	90						
TOTAL		10	350	10	380	10	420
Average Utilization = $\frac{\Sigma fx}{\Sigma f}$ *		35		38		42	

Remarks *(Use back of sheet if necessary)* West end of allotment was heavy, where East end was S/L.

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*Where f = the frequency or number of observations within each class interval *(f column)*, x = the class interval midpoint *(x column)*, and Σ = the summation symbol

GPO 857-211

EXAMPLE RM-2.5

Form 4412–8
(July 1967)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORM APPROVED
BUDGET BUREAU NO. 42–R1488

ACTUAL GRAZING USE SURVEY

Dear Sir:

In accordance with the management plan or with the terms and conditions of the license, permit, or lease which authorizes your grazing use, please complete this form and return to this Office at the close of the grazing season. This information, along with other range studies data, is needed to measure effectiveness of present management. Your cooperation in providing accurate information will be appreciated.

Name of allotment or pasture [illegible]

ACTUAL GRAZING USE

(fold here)

DATE	CLASS OR KIND OF LIVESTOCK	NUMBER		Reason for move (*Compliance with management plan, drought, avoid poison plants, strays, death, etc.*)
		IN	OUT	
[illegible]	Cattle	[illegible]0		[illegible]
[illegible]		[illegible]		[illegible]
[illegible]	Bulls	[illegible]		
[illegible]	Cattle	[illegible]		[illegible]
[illegible]	Cattle	[illegible]		[illegible]
[illegible]	Cattle			[illegible]
[illegible]	Cattle	[illegible]3		[illegible]
[illegible]	Cattle			[illegible]
[illegible]	Cattle			[illegible]
[illegible]	[illegible]			[illegible]
[illegible]	[illegible]			[illegible]
				[illegible]
				[illegible]

(fold here)

Remarks (*Include supplemental feed kind and amount, unauthorized use by strays, death loss, disease, etc.*)

[illegible]

Signature of range user	Date

Title 18 U.S.C. Section 1001, makes it a crime for any person knowingly and willfully to make to any department or agency of the United States any false, fictitious, or fraudulent statements or representations as to any matter within its jurisdiction.

Range Survey

In attempting to reallocate the available forage to all grazing users, (i.e., livestock and wildlife) through the planning process, it was necessary to make certain changes and adjustments to the range survey data in order to: (1) meet completion schedule deadlines, (2) conform with recently developed computer programs for data analysis and assimilation, and (3) comply with range management policy guidance consistent with sound land management decisions, regulations, and the NRDC-BLM Agreement in developing adequate grazing EIS as per NEPA requirement.

Data Base

To arrive at an eventual allocation of the forage resource within the MFP/EIS time constraints, it was necessary to agree upon the data base to be used. In the spring of 1978, State Office and Montrose District staff agreed to use the original range surveys completed in 1949 through early 1960s in the subject areas as the data base for allocation of forage.

In addition, since data gaps existed in the survey data by being lost or misplaced, a resurvey using the occular reconnaissance method of range survey (Manual 4412) (see Examples RM-2.6 and RM-2.7) completed only in those areas during the field season of 1978. These decisions are consistent with Bureau policy regarding interim-type Environmental Impact Statements.

It was also agreed upon to utilize developed computer programs for data computation and analysis due to allocation procedure complexities, time and available manpower constraints, as well as eliminating errors that would likely result if the data were to be processed manually.

Symbol Conversion

In order to have the data computer processed, it was first of all necessary to convert each individual plant species symbol occurring on old and new (1978) write-ups into a standardized 4, 5, or 6 capitalized letter symbol, as per Exhibit 407.1(a)(6) National Soils Handbook SCS Part II, dated 3/6/78.

Proper Use Factors

(PUFs) Proper use factor tables developed in 1962 (Livestock) and 1963 (Wildlife) were reviewed and updated as needed. Compilation of a

EXAMPLE RM-2.6

Form 4412–1
(November 1970)

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

FORAGE SURVEY TYPE WRITEUP
(OCULAR RECONNAISSANCE METHOD)

Writeup No. G-94

Date * 8/23/55

Aerial Photo No. 20-74

Examiner G. Frashier	KIND OF GRAZING ANIMAL *	SEASON OF USE	SECTIONS	TWP.	RGE.	MER.
Type 4-Atr-Car-Cla	Cattle	Yearlong	1, 2	48 N	3 W	NMPM
Ac/AUM 12.56						

	SPECIES	TOTAL ALLOWABLE PUF	% COMPOSITION	CATTLE PUF	COMP. X C PUF	SHEEP PUF	COMP. X S PUF	DEER PUF	COMP. X D PUF	PUF	COMP. X ___ PUF
GRASSES	Pse		8	30	.024						
	Carex		10	50	.050						
	Spi		8	50	.040						
	Shy		3	30	.009						
	Scb		2	50	.010						
	Ony		4	60	.024						
	Bgr		T								
	SUBTOTAL		35								
FORBS	Hypericum		2								
	Phlox		1								
	Eriogonum		1	10	.001						
	Erigeron		2								
	Astragalus		1	10	.001						
	Ala		T								
	Lupine		2	20	.004						
	Sco		1	30	.003						
	Berberis re.		T								
	Gillia		T								
	SUBTOTAL		10								
SHRUBS	Cmo		4	70	.028						
	Atr		30	5	.015						
	Cri		5	5	.0025						
	Cla		8	20	.016						
	Tca		1								
	Goa		4	10	.004						
	Ptr		1	50	.005						
	Soc		1	20	.002						
	Aal		1	40	.004						
	Pop		T								
	SUBTOTAL										
	TOTALS		100								

Av C PUF .2425 × Av Den .35 = FAF .0849 × 75 % Util = Net FAF .0637; FAR .8 ÷ Net FAF .0637 = 12.56 Ac/AUM

Av S PUF ____ × Av Den ____ = FAF ____ × ____ % Util = Net FAF ____; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

Av D PUF ____ × Av Den ____ = FAF ____ × ____ % Util = Net FAF ____; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

Av PUF ____ × Av Den ____ = FAF ____ × ____ % Util = Net FAF ____; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

Total Net FAF ____; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

---

* Livestock and major game species. *(Other game species making inappreciable use are:*

* Transfered to new form

EXAMPLE RM-2.7

UTILIZATION DEDUCTIONS IN PERCENT					
USE CRITERIA	CATTLE	SHEEP	DEER		
Slope	10				
Rocks or Stones	10				
Timber					
Lack of Water	5				
Unstable Soils					
Erosion					
Rodents					
Insects					
Other *(specify)*:					
TOTAL DEDUCTION	25				
PERCENT UTILIZABLE	75				

single PUF Table was necessary in order to utilize the computer program for the recomputation as previous survey write-ups had different PUF values depending on the administrative unit sampled for the same vegetative species. This was accomplished by the District Range Management Specialist, District Wildlife Biologist, and a Gunnison Resource Area Range Conservationist in October, 1978. In reviewing and updating the PUF Tables, guidance from Bureau Manual 4412.11A was used. As per sections 3f(1)(b), i, ii, iii, 3f(1)(c), 3f(2), 3f(2)(a), i, and 3f(2)(b) adjustments were made to numerous plant species. In making the adjustments, the following were used as a guide in addition to the manual sections cited:

1. PUF Tables from other BLM Districts as well as existing Montrose District tables.
2. Desirability and palatability ratings, as expressed in diet studies, fecal analysis, and various recognized publications.
3. Plant information network data developed at CSU, Fort Collins, Colorado.
4. Professional estimates and judgements, based on field experience reflecting seasonal usability and availability, as related to plant phenology, climatic conditions, animal preference, and species association with other species.
5. Big game food studies: Foods Eaten by the Rocky Mountain Elk, R.C. Kufeld, Journal of Range Management, Vol. 26, No. 2, 1973.

Types of changes and/or adjustments made to the table were as follows:

1. The table was restructured permitting assignment of a PUF value to each plant species being grazed by specific foraging animals (i.e., cattle, sheep, deer, elk) during the four seasons of the year and year long. The seasons were identified as follows: Spring 04-01 to 06-30, Summer 07-01 to 09-30; Fall 10-01 to 12-15, Winter 12-16 to 03-31, and Yearlong 01-01 to 12-31. Applicability for assignment of season is that stocking rates would result from computations based upon grazing use made during any specific season using the appropriate PUF value for the plant species for that season. If grazing use was made during any two or more seasons of the year, the yearlong PUF value would be used in the computation to determine the stocking rate. For wildlife (Gunnison Basin), if the mapped use area has winter (4 months), the computer assumed a winter PUF, if the

mapped use area was summer (8 months), the computer assumed a yearlong PUF. In American Flats, the computer assumed a yearlong PUF in winter (8 months) mapped use areas and a summer PUF in summer (4 months) mapped use areas. In addition, originally a total allowable proper use factor was derived for each plant species, in accordance with 4412.11A wf(2). This factor was set at the upper limit allowed a particular kind of animal having a preference for the species, regardless of the season. This factor represents the maximum limit of combined use that could be made of the species during any season of the year or yearlong by any combination of grazing animals. The computer program, however, was set up to consider in the overlap program a maximum value of 50 percent on each species unless adjusted downward based upon some other value.

2. PUF values were not assigned to plant species considered poisonous for a specific foraging animal.

3. Species considered as key forage plants to a particular kind of grazing animal were assigned maximum proper use of 50 percent. This is consistent with 4412.11A 3f(1)(b)ii. It is recognized that even though certain desirable herbaceous and browse species can tolerate use up to 60 percent total removal of the current season's growth during specific seasons, a maximum allowable use of 50 percent was established to compensate for removal by users other than livestock or big game, i.e., insects and rodents.

4. Certain grazable annuals such as Bromus tectorum and Festuca octoflora were assigned PUF values up to 60 percent during the spring season only, and 10 percent during the remaining seasons and yearlong. It was felt that 60 percent spring use could, and most often is, made on these species without detrimental effects to the more desirable perennial forage species. The PUF for the remaining seasons and yearlong was set sufficiently lower to prevent deterioration to desirable perennials. This is a result of the species being cool season winter annuals--beginning growth and producing good quality and desirable forage before most perennials even start growth. However, as the season advances, yields and quality decline rapidly.

In general, the new Proper Use Factor Table was a reasonable attempt to correct recognized and somestimes obvious deficiencies that eventually relate to a higher stocking rate and carrying capacity than the vegetation resource can realistically accommodate under a sustained yield approach (see Example RM-2.8).

EXAMPLE RM-2.8

```
                         NOVEMBER 26,1978     COLORADO              MONTROSE            GUNNISON BASIN

            PLANTS                                         MAXIMUM ALLOWANCE BY CLASS OF ANIMAL                          PAGE  7
                                         ***SPRING USE***   ***SUMMER USE***   ***FALL   USE***   ***WINTER USE***   ***YRLONG USE***
N-ID  SYMBOL SCIENTIFIC BINOMIAL,          C   S   D   E          C   S   D   E          C   S   D   E          C   S   D   E

 0755 ARCO9  ARNICA CORDIFOLIA            10  20  10  10   0   0  10  10  10  20   0   0   5  10   0  20   0   0   0   0   0  10   0   0  10  10  10  20   0   0
 0760 ARFU   ARNICA FULGENS               10  20  10  10   0   0  10  10  10  20   0   0   5  10   0  20   0   0   0   0   0  10   0   0  10  10  10  20   0   0
 0765 ARLO6  ARNICA LONGIFOLIA            10  20  10  10   0   0  10  10  10  20   0   0   5  10   0  20   0   0   0   0   0  10   0   0  10  10  10  20   0   0
 0770 ARTEM  ARTEMISIA SP                  0  10   5   5   0   0   0  10  10  15   0   0   0  10  15  10   0   0   0  10  20  15   0   0   0  10  10   5   0   0
 0775 ARDR4  ARTEMISIA DRACUNCULUS         0  10   5   5   0   0   0  10  10  15   0   0   0  10  15  10   0   0   0   0  20  15   0   0   0  10  10   5   0   0
 0780 ARLU   ARTEEMISIA LUDOVICIANA        0  10  15   5   0   0   0  10  20  10   0   0   0  10  10   0   0   0   0   0   0   0   0   0   0  10  10   5   0   0
 0785 ARSC   ARTEMISIA SCOPULORUM          0   0  15   5   0   0   0  10  20  10   0   0   0  10  10   0   0   0   0   0   0   0   0   0   0  10  10   5   0   0
 0790 ASCLE  ASCLEPIAS SP                  0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 0795 ASTER  ASTER SP                     10  30  20  20   0   0  10  30  40  25   0   0   0   0  15  15   0   0   0   0   5   5   0   0  10  30  20  20   0   0
 0800 ASTRA  ASTRAGALUS SP                 0   0  20  20   0   0   0   0  10  10   0   0   0   0  10  10   0   0   0   0   0   0   0   0   0   0  10  10   0   0
 0805 ASDR3  ASTRAGALUS DRUMMONDII        10  20  20  20   0   0  10  20  10  10   0   0   0   0  10  10   0   0   0   0   0   0   0   0  10  20  10  10   0   0
 0810 ATAYI  ATHYRIUM SP                   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 0815 ATRIP  ATRIPLEX SP                  10  30  20  20   0   0   0  10  40  25   0   0  10  30  15  15   0   0   0  10   5  15   0   0  10  30  20  15   0   0
 0820 AULOS  AULOSPERMUM SP                0  20  15   5   0   0   0   0  20  10   0   0   0   0  10   0   0   0   0   0   0   0   0   0   0   0  10   5   0   0
 0825 BAHIA  BAHIA SP                      0  20  15   5   0   0   0   0  20  10   0   0   0   0  10   0   0   0   0   0   0   0   0   0   0   0  10   5   0   0
 0830 BALSA  BALSAMORHIZA SP              20  40  25  40   0   0  20  40  45  45   0   0  10  30  20  30   0   0   0  10   5  20   0   0  20  40  25  50   0   0
 0835 BAIN   BALSAMORHIZA INCANA          20  40  25  40   0   0  20  40  45  45   0   0  10  30  20  30   0   0   0  10   5  20   0   0  20  40  25  30   0   0
 0840 BASA3  BALSAMORHIZA SAGITTATA       20  40  25  40   0   0  20  40  45  45   0   0  10  30  20  30   0   0   0  10   5  20   0   0  20  40  25  30   0   0
 0845 BIDEN  BIDENS SP                    20  40   0   0   0   0  20  40   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0  20  40   0   0   0   0
 0850 BIBI   BISTORTA BISTORTOIDES         0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 0855 BLCA   BLITUM CAPITATUM              0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0   0
 0860 BRASS  BRASSICA SP                   5  10  15   5   0   0   5  10  20  10   0   0   0   0  10   0   0   0   0   0   0   0   0   0   5  10  10   5   0   0
 0865 CALOC  CALOCHORTUS SP               10  20  15  10   0   0   0   0  20  15   0   0   0   0  10   5   0   0   0   0   0   0   0   0   0   0  10   5   0   0
 0870 CAEL   CALOCHORTUS ELEGANS          10  20  15  10   0   0   0   0  20  15   0   0   0   0  10   5   0   0   0   0   0   0   0   0   0   0  10   5   0   0
 0875 CAGU   CALOCHORTUS GUNNISONII       10  20  15  10   0   0   0   0  20  15   0   0   0   0  10   5   0   0   0   0   0   0   0   0   0   0  10   5   0   0
```

Forage Acre Requirement

Forage Acre Requirement (FAR) values used in the recompilation of the Gunnison Range survey are .8, .16, .20, and .64, respectively for cattle, sheep, deer, and elk. By using these values, stocking rates, resulting from the computer computation are expressed as acres per cow unit month, sheep unit month, deer unit month, and elk unit month. These values were derived by dividing the FAR by conversion factors of 1, 5, 4, and 1.25 respectively.

The basic FAR of .8 used in the Gunnison Basin recomputation is the same value that was used in the computation of the original range survey. Due to time constraints, additional FAR studies were not conducted in the appropriate areas, hence, the decision to use the original FARs was made.

Range Suitability

Range suitability determinations as noted during the 1958-62 range survey were used in the recompilation effort to arrive at a forage allocation for the subject areas. These determinations were made as a percent utilization deduction on each affected write-up, and applied only to domestic livestock, i.e., sheep and cattle, except for rockiness, which was applied to deer and elk. It is extremely difficult to surmise what specific criteria were actually used in making the original suitability determinations, however, steepness of slope, distance from water, erosion, inaccessibility due to rocks, heavy brush, down timber, or any combination of limiting factors was certainly considered. It is recognized that deductions taken during the 1958-62 period were judgmental and probably not uniformly applied; however, professionals in most cases made the determinations to the best of their abilities and experience. Without further field work, to more accurately determine suitability against present criteria, the decision was made to use on-hand existing information, i.e., utilization deductions.

In the American Flats-Silverton area this unique high elevation (11,000 to 14,000 feet), range has been grazed for many years by herded sheep from July through September. Slopes, some in excess of 150 to 200 percent that support herbaceous alpine and sub-alpine vegetation have, in the past, and are presently being utilized without detrimental effects to the basic soil and vegetation resources. For this reason, utilization deductions were taken mainly for non-producing areas included within the type rather than for steepness of slope.

Computer Program

The program that was used to compile both the original and new range surveys was divided into three parts: the Cord I-Cord II portion of the program, the overlap portion, and the goal portion. This program was developed at Colorado State University and others (see Example RM-2.9). The actual program is available for public inspection in the Montrose District files.

Allotment Inspections

Allotments were visited by resource specialists prior to 1978, but visits were intensified during the summer of 1978. Data were collected and anlyzed to help determine present and potential forage allocation to livestock and wildlife. Studies included, aerial counts of big game, browse utilization, and pellet group counts.

Interviews

Range users were interviewed to help fill information voids in actual use, distribution of livestock and wildlife, range improvements, herd size, and visitors use by the general public (ORV use and general sight seers).

General public concerns were aired through public planning meetings prior to preparation of the Unit Resource Analysis (URA) and Management Framework Plan (MFP).

ALLOCATION OF POTENTIAL VEGETATION

For each range site, the climax or potential production was estimated for a given range site for each species by weight, in favorable years and in less favorable years. The average for each range site was used to determine the potential forage. It was assumed the amount of forage needed to sustain one cow and calf on a maintenance ration is 750 pounds of air-dry roughage. The proper use factors used in the calculations were the same as those used in determining the present AUMs. A sample calculation for Thurber fescue (*Festuca thurberi*) in the subalpine loam range site is:

40 percent PUF x 45 percent Comp. x 2,000 pounds annual yield/acre = 360 pounds/acre:

EXAMPLE RM-2.9

Between 2

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                                              UNITED STATES DEPARTMENT OF THE INTERIOR
                                                    BUREAU OF LAND MANAGEMENT
                                                 FORAGE PRODUCTION BY ALLOTMENT
     REPORT DATE    : NOVEMBER 26,1978
     STATE          :  COLORADO
     DISTRICT       :    MONTROSE
     RESOURCE AREA  :   GUNNISON BASIN
     PLANNING UNIT  : CEBOLLA
     ALLOTMENT      : INDIAN CREEK


                                           FEDERAL     LANDS      410 ACRES

                   *** SUITABLE ***                       *** POTENTIALLY SUITABLE ***                      *** UNSUITABLE ***
  ANIMAL     SPRING  SUMMER   FALL     WINTER   YRLONG   SPRING  SUMMER   FALL    WINTER  YRLONG    SPRING  SUMMER   FALL     WINTER   YRLONG

  CATTLE       38.5    42.0    33.0     38.7     41.1      0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  SHEEP       202.5   131.6   179.1    186.6    185.0      0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  DEER        151.5   103.4   142.6    162.6    112.4      0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  ELK          32.3    30.5    36.3     48.2     34.2      0.      0.      0.      0.      0.        0.      0.      0.       0.       0.


                                           STATE       LANDS        0 ACRES

                   *** SUITABLE ***                       *** POTENTIALLY SUITABLE ***                      *** UNSUITABLE ***
  ANIMAL     SPRING  SUMMER   FALL     WINTER   YRLONG   SPRING  SUMMER   FALL    WINTER  YRLONG    SPRING  SUMMER   FALL     WINTER   YRLONG

  CATTLE       0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  SHEEP        0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  DEER         0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  ELK          0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.


                                           PRIVATE     LANDS        0 ACRES

                   *** SUITABLE ***                       *** POTENTIALLY SUITABLE ***                      *** UNSUITABLE ***
  ANIMAL     SPRING  SUMMER   FALL     WINTER   YRLONG   SPRING  SUMMER   FALL    WINTER  YRLONG    SPRING  SUMMER   FALL     WINTER   YRLONG

  CATTLE       0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  SHEEP        0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  DEER         0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  ELK          0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.


                                           OTHER       LANDS        0 ACRES

                   *** SUITABLE ***                       *** POTENTIALLY SUITABLE ***                      *** UNSUITABLE ***
  ANIMAL     SPRING  SUMMER   FALL     WINTER   YRLONG   SPRING  SUMMER   FALL    WINTER  YRLONG    SPRING  SUMMER   FALL     WINTER   YRLONG

  CATTLE       0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  SHEEP        0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  DEER         0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
  ELK          0.      0.      0.       0.       0.        0.      0.      0.      0.      0.        0.      0.      0.       0.       0.
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610's cont.

360 pounds/acre divided by 750 pounds = .48 AUM/acre Feth (see Example RM-2.10).

Only the suitable acreage was used in the calculations. All unclassified (timbered, steep sloped, rock outcrops) acreage was not incorporated into the potential calculations.

EXAMPLE RM-2.10

POTENTIAL FORAGE--SUBALPINE LOAM RANGE SITE

	CPUF 1/	SPUF 2/	% COMP. 3/	LBS./ACRE 4/	CATTLE LBS./ACRE	SHEEP LBS./ACRE
Feth	40	30	45	2,000	360	270
Dapa 2	40	20	10	2,000	80	40
Bran	50	40	5	2,000	50	40
Agsu	50	50	5	2,000	50	50
Pofe	40	40	5	2,000	40	40
Stco 3	30	20	3	2,000	18	12
Viam	25	40	3	2,000	15	24
Lale 2	20	25	3	2,000	12	24
Erige 2	10	20	2	2,000	4	8
Luar 3	0	0	2	2,000	0	0
Geran	25	35	1	2,000	5	7
Penst	0	0	1	2,000	0	0
Arca 13	0	0	4	2,000	0	0
Symph	5	10	3	2,000	3	6
Potr 4	10	20	2	2,000	4	8
Rosa	0	5	1	2,000	0	1
				Totals	641	530
750 lbs. = 1 AUM				Ac/AUM	1.2	1.4

1/ Cattle Proper Use Factor
2/ Sheep Proper Use Factor
3/ Percent Composition
4/ Pounds of Air-dry Forage/Acre (Average)

POTENTIAL AUMS ALLOCATABLE--LONG TERM (2005)

	Present	MFP/Spring Rest Alternative		Fall Rest Alternative		No Action Alternative	Elimination of Livestock Grazing Alternative		Optimize Wildlife and Watershed Values Alternative		Optimize Livestock Grazing Alternative	
		1/	2/	1/	2/	1/	1/	2/	1/	2/	1/	2/
Total	96,154	91,207	111,728	101,848	126,169	86,687	123,889	151,351	113,705	134,380	66,733	118,569
Wildlife	36,141	39,614	48,527	44,236	54,799	32,583	91,250	96,848	83,749	98,977	14,734	26,180
Livestock	60,013	51,593	63,201	57,612	71,370	54,104	0	0	29,956	35,403	51,999	92,389

1/ Management

2/ Management with treatment

APPENDIX RM-3

APPENDIX RM-3

PERIOD OF USE/INTENSITY OF MANAGEMENT--ALL ALTERNATIVES

			Period of Use				Intensity of Management				
Allotment Number	Name of Allotment	Acres Public Land	MFP/Spring Rest Alternative and Fall Rest Alternative	No Action Alternative Present Situation	Optimize Wildlife/ Watershed Alternative	Optimize Livestock Alternative	Fall Rest and Spring Rest Grazing Schedule	Intensity	Optimize WL/WS Alt.	Optimize LV. Alt.	No Action Alt.
5209	Gunnison River	642	5/16-6/16	NLG 1/	NLG	5/15-12/30		NLG	NLG	LI 2/	LI
6000	Soap Creek	33	5/16-10/15	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	LI	LI
6001	Goose Creek	2,941	5/16-10/6	5/1-12/30	6/15-9/30	5/1-12/30	A 4/	AMP 3/	AMP	AMP	LI
6003	Veo	539	6/13-10/10	5/15-12/30	6/1-9/30	5/15-12/30		LI	LI	LI	LI
6004	Collins	332	5/18-10/15	5/15-12/30	6/1-9/30	5/15-12/30		LI	LI	LI	LI
6005	Soderquist	580	6/16-10/31	6/15-12/30	7/1-9/30	6/15-12/30		LI	LI	AMP/C	LI
6006	Blue Mesa	478	5/20-11/1	5/15-12/30	6/1-9/30	5/15-12/30		LI	LI	AMP/C	LI
6007	Blue Mesa	462	5/20-10/1	5/15-12/30	6/1-9/30	5/15-12/30		LI	LI	AMP/C	LI
6008	Colorado-Utah	541	5/16-9/16	6/15-12/30	7/1-9/15	6/15-12/30		LI	LI	LI	LI
6009	Foughnier	37	6/10-10/1	6/15-12/30	7/1-9/15	6/15-12/30		LI	LI	LI	LI
6010	Willow Creek UMT	2,325	5/16-9/30	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	LI	LI
6011	Willow Creek	1,075	6/7-11/26	6/15-12/30	7/1-9/30	6/15-12/30	C	AMP	AMP	AMP	AMP
6013	Blythe	302	6/1-9/30	6/15-12/30	7/1-7/15	6/15-12/30		LI	LI	LI	LI
6014	Butte Creek	20	6/1-9/30	6/15-12/30	7/1-7/15	6/15-12/30		LI	LI	LI	LI
6015	Youmans	73	5/10-11/5	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	LI	LI
6016	Curecanti Sheep	607	5/16-11/30	6/15-12/30	6/15-9/30	6/15-12/30		LI	LI	LI	LI
6017	Newberry	46	5/15-8/14	5/15-12/30	6/1-9/30	5/15-12/30		LI	LI	AMP/A	LI
6018	High Mesa	3,376	7/17-8/25	6/15-12/30	7/15-9/15	6/15-12/30		LI	LI	AMP/C	LI
6019	Butte	198	10/16-11/15	NLG	NLG	6/15-12/30		NLG	NLG	LI	LI
6021	Cimarron Land	268	6/1-9/30	6/15-12/30	7/15-9/15	6/15-12/30		LI	LI	LI	LI
6022	Wilson	35	5/1-10/31	5/15-12/30	6/1-9/30	5/15-12/30		LI	LI	LI	LI
6024	Little Cimarron	639	6/1-10/15	6/15-12/30	7/1-9/15	6/15-12/30		LI	LI	AMP/C	LI
6026	Soderquist	98	6/15-9/5	5/15-12/30	6/1-9/30	5/15-12/30		LI	LI	LI	LI
6027	Antholz	225	7/1-9/12	6/15-12/30	7/1-9/15	6/15-12/30	C	LI/AMP	LI	AMP	LI
6029	Howell	165	6/15-10/15	6/15-12/30	7/1-9/15	6/15-12/30		LI	LI	LI	LI
6030	Masden	100	5/15-11/15	6/15-12/30	7/1-9/15	6/15-12/30		LI	LI	LI	LI
6031	Alpine Plateau	2,544	6/21-9/30	6/15-12/30	7/15-9/15	6/15-12/30	C	AMP	LI	AMP	LI
6032	Blue Mesa	1,739	6/21-9/30	6/15-12/30	7/15-9/15	6/15-12/30	C	AMP	LI	AMP	LI
6033	Willow Creek AMP	3,428	6/22-9/30	6/15-12/30	7/15-9/15	6/15-12/30	C	AMP	AMP	AMP	AMP
6034	Little Willow	1,092	5/30-8/1	6/15-12/30	7/15-9/15	6/15-12/30	C	AMP	LI	AMP	LI
6036	Blue Cimarron	40	9/16-11/30	6/15-12/30	7/15-9/15	6/15-12/30		LI	LI	LI	LI
6037	Windy Point	491	6/20-11/1	6/15-12/30	7/1-9/30	6/15-12/30		LI	LI	AMP/C	LI

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[1] NLG = No Livestock Grazing

[2] LI = Less Intensive (Some AMP allotments under Optimize Livestock also have a proposed grazing schedule, e.g., AMP/C)

[3] AMP = Allotment Management Plan

[4] Same for all alternatives unless otherwise noted.

APPENDIX RM-3

PERIOD OF USE/INTENSITY OF MANAGEMENT--ALL ALTERNATIVES
(continued)

			Period of Use				Intensity of Management				
Allotment Number	Name of Allotment	Acres Public Land	MFP/Spring Rest Alternative and Fall Rest Alternative	No Action Alternative Present Situation	Optimize Wildlife/ Watershed Alternative	Optimize Livestock Alternative	Fall Rest and Spring Rest Grazing Schedule	Intensity	Optimize WL/WS Alt.	Optimize LV. Alt.	No Action Alt.
6040	Butte Rock	326	8/1-8/31	6/15-12/30	7/1-9/30	6/15-12/30		LI	LI	AMP/C	LI
6050	Maurer Blue Canyon	1,492	6/8-11/15	6/15-12/30	7/1-9/15	6/15-12/30	F	AMP	AMP	AMP	LI
6051	Nicolas Big Blue	632	7/1-8/31	6/15-12/30	7/15-9/15	6/15-12/30		LI	LI	AMP/C	LI
6052	Nicolas Big Park	1,536	7/1-9/30	6/15-12/30	7/15-9/15	6/15-12/30		LI	LI	AMP/C	LI
6053	Cox Park	938	6/29-9/29	6/15-12/30	7/15-9/15	6/15-12/30	C	AMP	LI	AMP	LI
6054	Johnson Park	945	7/15-9/30	6/15-12/30	7/15-9/15	6/15-12/30		LI	LI	AMP/C	LI
6055	Pine Crest	2,074	5/16-10/31	5/15-12/30	7/15-9/15	5/15-12/30		LI	LI	LI	LI
6056	Highway	2,512	5/18-2/1	6/15-12/30	6/15-9/15	6/15-12/30	B	AMP	LI	AMP	LI
6060	Gateview Unalloted	714	NLG	NLG	NLG	7/1-12/30		NLG	NLG	LI	NLG
6061	Burke and Romer	428	6/15-10/15	6/15-12/30	7/15-9/15	6/15-12/30		LI	LI	LI	LI
6062	Stock Drive	2,342	NLG	NLG	NLG	7/1-12/30		NLG	NLG	AMP/C	NLG
6100	Ten Mile Spring	15,329	5/16-11/5	5/1-12/30	6/15-9/30	5/1-12/30	A	AMP	AMP	AMP	LI
6101	Sapinero	8,101	5/10-11/8	5/1-12/30	6/15-9/30	5/1-12/30	A	AMP	AMP	AMP	LI
6102	Powderhorn	4,022	7/15-8/1	7/1-12/30	7/15-9/1	7/1-12/30	E	AMP	AMP	AMP	LI
6103	Indian Creek	18,714	5/16-11/26	5/15-12/30	6/15-9/30	5/15-12/30	B/F	AMP	AMP	AMP	AMP
6104	Powderhorn AMP	28,799	5/6-12/10	5/15-12/30	6/15-9/15	5/15-12/30	B/C	AMP	AMP	AMP	AMP
6105	Yeager Gulch	7,206	6/1-10/19	5/15-12/30	6/15-9/30	5/15-12/30	B/F	AMP	AMP	AMP	AMP
6106	Huntsman Mesa	1,238	5/16-10/31	5/15-12/30	7/1-9/30	5/15-12/30		LI	LI	AMP/B	LI
6107	Iola-Powderhorn	109,851	5/11-11/5	5/15-12/30	6/15-9/30	5/15-12/30	A/C/F	AMP	AMP	AMP	AMP
6108	Park Creek	10,069	5/16-11/15	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	AMP	AMP	AMP
6109	Monuments	6,908	6/1-11/30	6/1-12/30	7/1-9/30	6/1-12/30	C	AMP	AMP	AMP	LI
6111	Cathedral	4,290	6/1-11/14	6/1-12/30	7/1-9/30	6/1-12/30	C	AMP	AMP	AMP	LI
6112	Cobolla Creek	6,477	5/21-11/15	6/1-12/30	7/1-9/30	6/1-12/30	C	AMP	AMP	AMP	LI
6113	Mineral Creek	59	6/16-9/15	6/1-12/30	7/1-9/30	6/1-12/30		LI	LI	AMP/C	LI
6114	Horseshoe	144	10/1-10/7	6/1-12/30	7/1-9/30	6/1-12/30		LI	LI	LI	LI
6115	Devils Lake	7,075	7/6-9/15	7/1-12/30	8/1-9/1	7/1-12/30	E/G	AMP	AMP	AMP	LI
6116	Ute Trail	747	6/15-9/19	7/1-12/30	7/15-9/30	7/1-12/30		LI	LI	LI	LI
6117	Lone Pine	1,070	5/20-10/25	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6120	Red Ride	902	5/16-12/20	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6123	Fourth of July	498	6/1-9/30	6/1-12/30	6/15-9/30	6/1-12/30		LI	LI	AMP/B	LI
6125	J.S. Ward	97	5/16-7/15	6/1-12/30	6/15-9/30	6/1-12/30	B	AMP	LI	AMP	LI
6127	Lake Fork	1,784	6/16-10/5	6/1-12/30	6/15-9/30	6/1-12/30	B	AMP	LI	AMP	LI
6128	Friends Creek	1,973	6/19-10/18	6/15-12/30	7/1-9/30	6/15-12/30		LI	LI	AMP/B	LI
6129	Waterdog Lake	461	6/9-9/30	6/15-12/30	7/1-9/15	6/15-12/30		LI	LI	LI	LI

APPENDIX RM-3

PERIOD OF USE/INTENSITY OF MANAGEMENT--ALL ALTERNATIVES
(continued)

			Period of Use				Intensity of Management				
Allotment Number	Name of Allotment	Acres Public Land	MFP/Spring Rest Alternative and Fall Rest Alternative	No Action Alternative Present Situation	Optimize Wildlife/ Watershed Alternative	Optimize Livestock Alternative	Fall Rest and Spring Rest Grazing Schedule	Intensity	Optimize WL/WS Alt.	Optimize LV. Alt.	No Action Alt.
6130	Campbell Creek	85	7/1-11/20	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6131	Hells Canyon	723	10/21-12/31	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6132	Ranch Pasture	22	5/16-6/15	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	LI	LI
6133	Lake Fork Unallotted	1,726	NLG	NLG	NLG	5/15-12/30		NLG	NLG	LI	NLG
6134	Elk Pasture Unallotted	3,490	NLG	NLG	NLG	5/15-12/30		NLG	NLG	AMP/B	NLG
6150	Round Mountain	297	5/15-6/10	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6180	Rock Creek	1,987	5/10-5/31	5/15-12/30	6/15-9/30	5/15-12/30	C/F	AMP	LI	AMP	LI
6200	Dillon Mesa	2,358	6/1-10/5	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6201	Oswald	85	6/1-8/31	5/15-12/30	6/1-9/30	5/15-12/30		LI	LI	LI	LI
6202	Stevens Creek	9,267	5/9-11/4	5/15-12/30	6/1-9/30	5/15-12/30	B	AMP	AMP	AMP	LI
6203	Beaver Creek	9,270	5/10-10/15	5/15-12/30	6/1-9/30	5/15-12/30	B/F	AMP	AMP	AMP	LI
6204	Stuben Creek	401	5/10-9/9	6/1-12/30	6/1-9/30	6/1-12/30	C	AMP	LI	AMP	LI
6205	Spann	76	4/15-5/20	5/15-12/30	6/1-9/30	5/15-12/30		LI	LI	AMP/B	LI
6206	Blinberry Gulch	3,028	5/22-6/26	5/15-12/30	6/1-9/30	5/15-12/30	B/F	AMP	AMP	AMP	LI
6207	West Antelope	758	6/1-6/30	6/1-12/30	6/15-9/30	6/1-12/30	C	AMP	LI	AMP	LI
6208	West Antelope Creek	3,658	5/15-6/15	5/15-12/30	6/15-9/30	5/15-12/30	B/F	AMP	AMP	AMP	LI
6210	Antelope Creek	364	7/3-8/18	6/1-12/30	6/15-9/30	6/1-12/30	C	AMP	LI	AMP	LI
6212	Towner	421	6/1-9/20	5/15-12/30	6/15-9/30	6/1-12/30	B	AMP	LI	AMP	LI
6213	Mill Creek	621	6/16-10/15	5/15-12/30	6/15-9/30	6/1-12/30	B	AMP	LI	AMP	AMP
6215	West Side Unallotted	154	NLG	NLG	NLG	NLG		NLG	NLG	LI	NLG
6216	Antelope Creek	1,633	5/20-7/2	6/1-12/30	6/15-9/30	6/1-12/30	C/F	AMP	LI	AMP	LI
6217	Harris Exchange of Use	244	5/9-11/4	5/15-12/30	6/15-9/30	6/1-12/30		LI	LI	AMP/B	LI
6250	Wildlife Land	4,672	NLG	NLG	NLG	6/1-12/30		NLG	NLG	AMP	NLG
6251	Robbins Exchange of Use	139	5/9-11/4	5/15-12/30	6/1-9/30	5/15-12/30		LI	LI	LI	LI
6300	Sheeps Gulch	11,363	5/10-11/6	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	AMP	AMP	AMP
6301	Cabin Creek	14,784	5/6-11/4	5/15-12/30	6/15-9/30	5/15-12/30	B/F	AMP	AMP	AMP	LI
6302	Alder Creek	11,517	5/6-11/4	5/15-12/30	6/15-9/30	5/15-12/30	B/F	AMP	AMP	AMP	LI
6303	Line Spring	1,138	5/16-9/30	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6304	Doyleville Group	3,824	5/6-8/30	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	AMP	AMP	LI
6305	Woods Gulch	5,968	5/11-10/11	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	AMP	AMP	LI
6306	Waunita Hot Springs	657	5/11-6/15	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6307	Taylor Park	145	5/1-10/31	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	AMP/B	LI
6308	Hot Springs	841	5/11-11/15	5/15-12/30	6/1-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6309	Tomichi Dome	3,057	6/21-8/20	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	AMP	AMP	LI

APPENDIX RM-3

PERIOD OF USE/INTENSITY OF MANAGEMENT--ALL ALTERNATIVES
(continued)

			Period of Use				Intensity of Management				
Allotment Number	Name of Allotment	Acres Public Land	MFP/Spring Rest Alternative and Fall Rest Alternative	No Action Alternative Present Situation	Optimize Wildlife/ Watershed Alternative	Optimize Livestock Alternative	Fall Rest and Spring Rest Grazing Schedule	Intensity	Optimize WL/WS Alt.	Optimize LV. Alt.	No Action Alt.
6310	Pleasant View	1,094	5/15-6/15	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6311	Gold Basin	17,395	5/16-11/15	5/15-12/30	6/1-9/30	5/15-12/30	B	AMP	AMP	AMP	AMP
6312	Lower Cochetopa	30,259	5/16-10/15	5/15-12/30	6/1-9/30	5/15-12/30	B	AMP	AMP	AMP	AMP
6313	Stubbs Gulch	5,956	6/1-9/30	6/1-12/30	6/15-9/30	6/1-12/30	C	AMP	AMP	AMP	AMP
6314	Holly-Cochran	569	5/25-7/5	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	AMP/C	LI
6315	Upper Means	669	8/12-10/25	6/15-12/30	7/1-9/30	6/15-12/30	D	AMP	LI	AMP	LI
6316	Bead Creek	3,824	6/1-10/16	6/1-12/30	6/15-9/30	6/1-12/30	C	AMP	AMP	AMP	LI
6317	South Parlin Flats	15,569	5/1-9/22	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	AMP	AMP	LI
6318	Camp Kettle	15,855	5/15-10/1	5/15-12/30	6/15-9/30	5/15-12/30	B/F	AMP	AMP	AMP	LI
6320	Big Draw	1,848	5/25-6/25	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6323	Barrett Creek	1,597	5/15-6/14	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6324	Hoover	466	5/20-6/10	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	AMP/B	LI
6325	Mill Hill	1,116	5/20-6/15	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6326	Snyder Gulch	1,208	6/1-6/30	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6327	Vouga Reservoir	2,313	5/10-9/30	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6328	Rock Creek	4,503	6/1-9/30	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	AMP	AMP	LI
6329	West Pass Creek	11,069	5/16-9/30	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	AMP	AMP	LI
6338	Muddy-Poison	1,581	6/16-9/15	6/15-12/30	7/1-9/30	6/15-12/30	C	AMP	LI	AMP	AMP
6339	Gould	166	6/15-9/30	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	LI	LI
6342	Dome	3,006	7/1-8/30	6/1-12/30	6/15-9/30	6/1-12/30	C	AMP	LI	AMP	LI
6343	Poison Gulch	3,693	6/1-9/30	6/1-12/30	6/15-9/30	6/1-12/30	C	AMP	AMP	AMP	LI
6344	Trail Creek	2,032	6/1-9/30	6/1-12/30	7/1-9/30	6/1-12/30	C	AMP	LI	AMP	AMP
6346	Cochetopa Creek	905	6/1-9/30	6/1-12/30	7/1-9/30	6/1-12/30	C	AMP	LI	AMP	LI
6347	Manchego A	1,828	5/26-10/15	6/1-12/30	6/15-9/30	6/1-12/30	C	AMP	AMP	AMP	AMP
6348	Texas Creek	1,448	6/1-9/30	6/1-12/30	6/15-9/30	6/1-12/30	C	AMP	LI	AMP	LI
6349	Mesa	146	6/1-10/5	6/1-12/30	6/15-9/30	6/1-12/30	C	AMP	LI	AMP	LI
6350	Van Tassel	1,381	6/1-2/28	6/1-12/30	6/15-9/30	6/1-12/30	C	AMP	AMP	AMP	LI
6352	Hoyt	119	7/1-8/31	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	AMP/C	LI
6353	Lower Means	1,577	7/6-8/11	5/15-12/30	8/1-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6354	Vouga Reservoir Exchange	Combined with # 6327									
6355	Mill Ranches Unallotted	79	NLG	NLG	NLG	5/15-12/30		NLG	NLG	LI	NLG
6356	Doyleville Road	Combined with # 6329									
6357	Meaker	Combined with # 6329									
6358	Doyleville	Combined with # 6999									
6359	Baxter	717	5/16-6/30	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI

PERIOD OF USE/INTENSITY OF MANAGEMENT--ALL ALTERNATIVES
(continued)

			Period of Use				Intensity of Management				
Allotment Number	Name of Allotment	Acres Public Land	MFP/Spring Rest Alternative and Fall Rest Alternative	No Action Alternative Present Situation	Optimize Wildlife/ Watershed Alternative	Optimize Livestock Alternative	Fall Rest and Spring Rest Grazing Schedule	Intensity	Optimize WL/WS Alt.	Optimize LV. Alt.	No Action Alt.
6360	Big Draw	405	5/17-5/24	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6361	Manchego	Combined with # 6347									
6362	Cold Springs	1,645	6/1-9/30	6/15-12/30	7/1-9/30	6/15-12/30	C	AMP	LI	AMP	LI
6363	Coleman Exchange of Use	213	5/1-10/1	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	LI	LI
6364	Willis Exchange of Use	70	5/1-10/1	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	LI	LI
6365	Barrett Creek	267	7/1-7/26	5/15-12/30	6/15-9/30	5/15-12/30	B	AMP	LI	AMP	LI
6366	Hot Springs	Combined with # 6308									
6367	Piloni Exchange of Use	69	5/1-10/1	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	LI	LI
6368	Hann Unallotted	49	NLG	NLG	NLG	5/15-12/30		NLG	NLG	LI	NLG
6369	Dry Creek	Combined with # 6329									
6370	Archuleta	Combined with # 6329									
6371	Shearing Plant	Combined with # 6329									
6372	Alkali Creek	Combined with # 6328									
6373	South Homestead	Combined with # 6329									
6374	Reservoir	Combined with # 6344									
6375	Shearing Plant	Combined with # 6329									
6400	Jacks Cabin	179	6/1-10/30	6/15-12/30	7/1-9/30	6/15-12/30	D	AMP	LI	AMP	LI
6401	Flat Top	713	8/1-10/9	7/1-12/30	7/15-9/15	7/1-12/30	E	AMP	LI	AMP	LI
6402	Slate River	45	7/1-9/30	7/1-12/30	7/15-9/15	7/1-12/30	E	AMP	LI	AMP	LI
6999	Sargents Unallotted	735	NLG	5/15-12/30	6/15-9/30	5/15-12/30		LI	LI	LI	LI
6500	Wade Gulch	6,551	6/1-11/30	6/15-12/30	7/10-9/1	6/15-12/30	H	AMP	AMP	AMP	LI
6501	Ramboulet Park	1,093	7/1-9/20	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP
6502	Red Cloud	10,253	8/2-9/20	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	AMP	AMP	AMP
6503	Porter	5,448	6/1-10/1	6/1-11/30	7/1-9/30	6/1-11/30	H/I	AMP	AMP	AMP	LI
6504	Hanson Creek	9,953	7/10-9/9	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	AMP	AMP	AMP
6505	Chuchuru Brothers	10,600	7/10-9/20	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	AMP	AMP	AMP
6506	Burrough Park	8,173	7/14-9/15	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	AMP	AMP	AMP
6507	American Flats	1,294	7/10-8/31	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	AMP	AMP	AMP
6508	Mill Gulch	2,443	7/14-9/28	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP
6509	American Lake	5,603	7/10-9/15	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	AMP	AMP	AMP
6510	Poughkeepsie	786	7/10-9/15	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP

APPENDIX RM-3

PERIOD OF USE/INTENSITY OF MANAGEMENT--ALL ALTERNATIVES
(continued)

			Period of Use				Intensity of Management				
Allotment Number	Name of Allotment	Acres Public Land	MFP/Spring Rest Alternative and Fall Rest Alternative	No Action Alternative Present Situation	Optimize Wildlife/ Watershed Alternative	Optimize Livestock Alternative	Fall Rest and Spring Rest Grazing Schedule	Intensity	Optimize WL/WS Alt.	Optimize LV. Alt.	No Action Alt.
8900	Cement Creek	4,181	7/11-9/6	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP
8901	Gladstone	2,325	7/11-9/5	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP
8902	Eureka	6,221	7/10-9/15	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	AMP	AMP	AMP
8903	Price Brothers	3,072	7/11-9/15	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP
8904	Silver Lake	1,377	NLG	NLG	NLG	7/10-9/30		NLG	NLG	AMP/G	NLG
8905	Cunningham Gulch	1,738	8/10-9/15	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP
8906	Molas Lake	1,876	7/1-7/27	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP
8907	Deer Park	3,344	7/1-8/10	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP
8908	American Basin	2,650	7/15-9/15	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP
8909	Minnie Gulch	3,100	7/11-9/15	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP
8910	Elk Creek	949	NLG	NLG	NLG	7/10-9/30		NLG	NLG	AMP	NLG
8911	Maggie Gulch	6,100	7/28-8/24	7/10-9/30	8/1-9/1	7/10-9/30	G	AMP	LI	AMP	AMP
Unallotted American Flats		24,346	NLG	NLG	NLG	7/10-9/30		NLG	NLG	AMP/G	NLG

APPENDIX RM-4

APPENDIX RM-4

LAND STATUS BY ALLOTMENT

Allotment Number	Name	Public Land	Private Land	Other Federal	Total
5209	Gunnison River	642			642
6000	Soap Creek	33			33
6001	Goose Creek	2,941	747		3,688
6003	Veo	539	649		1,188
6004	Collins	332			332
6005	Soderquist	580	398		978
6006	Blue Mesa	478			478
6007	Blue Mesa	462	603		1,065
6008	Colorado-Utah	541			541
6009	Foughnier	37			37
6010	Willow Creek-UMT	2,325	1,120	800	4,245
6011	Willow Creek	1,075	1,655		2,730
6013	Blythe	302			302
6014	Butte Creek	20			20
6015	Youmans	73			73
6016	Currecanti Sheep	607			607
6017	Newberry	46			46
6018	High Mesa	3,376	466		3,842
6019	Butte	198			198
6021	Cimarron Land	268			268
6022	Wilson	35	74		109
6024	Little Cimarron	639	853		1,492
6026	Soderquist	98			98
6027	Antholz	225			225
6029	Howell	165	606		771
6030	Masden	100			100
6031	Alpine Plateau	2,544			2,544
6032	Blue Mesa	1,739	1,486		3,225
6033	Willow Creek-AMP	3,428	650		4,078
6034	Little Willow	1,092	698		1,790
6036	Blue Cimarron	40			40
6037	Windy Point	491			491
6040	Butte Rock	326			326
6050	Maurer Blue Canyon	1,492	2,219		3,711
6051	Nicolas Big Blue	632	2,316		2,948
6052	Nicolas Big Park	1,536	1,351		2,887
6053	Cox Park	938	760		1,698
6054	Johnson Park	945	680		1,625
6055	Pine Crest	2,074			2,074
6056	Highway	2,512	583		3,095
6060	Gateview (Unallotted)	714			714
6061	Burke and Romer	428			428
6062	Stock Drive	2,342			2,342
6100	Ten Mile Spring	15,329	3,579		18,908
6101	Sapinero	8,101	1,893	1,760	11,754
6102	Powderhorn	4,022			4,022
6103	Indian Creek	18,714	2,612		21,326
6104	Powderhorn-AMP	28,799	1,533		30,332
6105	Yeager Gulch	7,206	4,124		11,330
6106	Huntsman Mesa	1,238	2,570		3,808
6107	Iola-Powderhorn	109,851	27,680	1,520	139,051
6108	Park Creek	10,069	2,230		12,299
6109	Monuments	6,908	2,101		9,009

APPENDIX RM-4

LAND STATUS BY ALLOTMENT
(continued)

Allotment Number	Name	Public Land	Private Land	Other Federal	Total
6111	Cathedral	4,290			4,290
6112	Cebolla Creek	6,477	288		6,765
6113	Mineral Creek	59			59
6114	Horseshoe	144			144
6115	Devils Lake	7,075	201		7,276
6116	Ute Trail	747	913		1,660
6117	Lone Pine	1,070	742		1,812
6120	Red Ride	902	653		1,555
6123	Fourth of July	498	60		558
6125	J. S. Ward	97	145		242
6127	Lake Fork	1,784	638		2,422
6128	Friends Creek	1,973			1,973
6129	Waterdog Lake	461	146		607
6130	Campbell Creek	85	823		908
6131	Hells Canyon	723	187		910
6132	Ranch Pasture	22			22
6133	Lake Fork (Unallotted)	1,726			1,726
6134	Elk Pasture (Unallotted)	3,490			3,490
6150	Round Mountain	297	846		1,143
6180	Rock Creek	1,987	239		2,226
6200	Dillon Mesa	2,358	816	680	3,854
6201	Oswald	85	220		305
6202	Stevens Creek	9,267	2,176	280	11,723
6203	Beaver Creek	9,270	1,689		10,959
6204	Stuben Creek	401	423	80	904
6205	Spann	76	79		155
6206	Blinberry Gulch	3,028	290		3,318
6207	West Antelope	758			758
6208	West Antelope Creek	3,658	685		4,343
6210	Antelope Creek	364	1,071		1,435
6212	Towner	421			421
6213	Mill Creek	621			621
6215	West Side (Unallotted)	154			154
6216	Antelope Creek	1,633	1,600		3,233
6217	Harris (Exchange of Use)	244			244
6250	Wildlife Land	4,672			10,632 1/
6251	Robbins (Exchange of Use)	139			139
6300	Sheeps Gulch	11,363	725		12,088
6301	Cabin Creek	14,784	80		14,864
6302	Alder Creek	11,517	149		11,666
6303	Line Spring	1,138	331		1,469
6304	Doyleville Group	3,824	191		4,015
6305	Woods Gulch	5,968			5,968
6306	Waunita Hot Springs	657	286		943
6307	Taylor Park	145			145
6308	Hot Springs	807	25		832
6309	Tomichi Dome	3,057			3,057

1/ Allotment 6250 total (10,632) includes 5,960 acres of state-owned land.

LAND STATUS BY ALLOTMENT
(continued)

Allotment Number	Name	Public Land	Private Land	Other Federal	Total
6310	Plesent View	1,094	47		1,141
6311	Gold Basin	17,395	2,627		20,022
6312	Lower Cochetopa	30,259	6,550		36,809
6313	Stubbs Gulch	5,956	799		6,755
6314	Holly-Cochran	569	1,592		2,161
6315	Upper Means	669	814		1,483
6316	Bead Creek	3,824	1,409		5,313 2/
6317	South Parlin Flats	15,569	1,354		16,923
6318	Camp Kettle	15,855	243		16,098
6320	Big Draw	1,848	3		1,851
6323	Barrett Creek	1,597	7		1,604
6324	Hoover	466			466
6325	Mill Hill	1,116	43		1,159
6326	Snyder Gulch	1,208	75		1,283
6327	Vouga Reservoir	2,187	63		2,250
6328	Rock Creek	1,140	73		1,213
6329	West Pass Creek	4,938	193		5,131
6338	Muddy-Poison	1,581			1,581
6339	Gould	166			166
6342	Dome	3,006	374		3,380
6343	Poison Gulch	3,693	232		3,925
6344	Trail Creek	424	182		606
6346	Cochetopa Creek	905	80		985
6347	Monchego A	1,013	314		1,327
6348	Texas Creek	1,448	333		1,781
6349	Mesa	146	457		603
6350	Van Tassel	1,381			1,381
6352	Hoyt	119			119
6353	Lower Means	1,577	1,125		2,702
6354	Vouga Reservoir Exchange	126			126
6355	Mill Ranches (Unallotted)	79			79
6356	Doyleville Road	1,212	11		1,223
6357	Meaker	331	51		382
6358	Doyleville	483			483
6359	Baxter	717			717
6360	Big Draw	405	72		477
6361	Manchego	815			815
6362	Cold Springs	1,645	475		2,120
6363	Coleman (Exchange of Use)	213			213
6364	Willis (Exchange of Use)	70			70
6365	Barrett Creek	267	82		349
6366	Hot Springs	34	204		238
6367	Pilon (Exchange of Use)	69			69
6368	Hann (Unallotted)	49			49
6369	Dry Creek	184	146		330
6370	Archuleta	572	483		1,055
6371	Shearing Plant	670			670
6372	Alkali Creek	3,363	1,081		4,444
6373	South Homestead	2,114	857		2,971
6374	Reservoir	1,608	254		1,862
6375	Shearing Plant	1,048	111		1,159

2/ Allotment 6316 total (5,313) includes 80 acres of state-owned land.

LAND STATUS BY ALLOTMENT
(continued)

Allotment Number	Name	Public Land	Private Land	Other Federal	Total
6400	Jacks Cabin	179	301		480
6401	Flat Top	713			713
6402	Slate River	45			45
6999	Sargents (Unallotted)	252			252
6500	Wade Gulch	6,551	1,908		8,459
6501	Ramboulet Park	1,093			1,093
6502	Red Cloud	10,253	69		10,322
6503	Porter	5,448	781		6,229
6504	Hanson Creek	9,953	1,099		11,052
6505	Chuchuru Brothers	10,600	899		11,499
6506	Burrows Park	8,173	134		8,307
6507	American Flats	1,294	116		1,410
6508	Mill Gulch	2,443			2,443
6509	American Lake	5,603	183		5,786
6510	Poughkeepsie	786	466		1,252
8900	Cement Creek	4,181	922		5,103
8901	Gladstone	2,325	977		3,302
8902	Eureka	6,221	1,896		8,117
8903	Price Brothers	3,072	1,484		4,556
8904	Silver Lake	1,377			1,377
8905	Cunningham Gulch	1,738	425		2,163
8906	Molas Lake	1,876	339		2,215
8907	Deer Park	3,344	313		3,657
8908	American Basin	2,650	1,484		4,134
8909	Minnie Gulch	3,100			3,100
8910	Elk Creek	949			949
8911	Maggie Gulch	6,100			6,100
	Unallotted American Flats	24,346			24,346
TOTAL		635,851	120,546	5,120	766,576

APPENDIX RM-5

APPENDIX RM-5

FOREST SERVICE/ BUREAU OF LAND MANAGEMENT COOPERATIVE GRAZING AGREEMENTS

6018	High Mesa
6031	Alpine Plateau
6032	Blue Mesa
6033	Willow Creek AMP
6052	Nicolas Big Park
6054	Johnson Park
6109	Monuments
6112	Cebolla Creek
6200	Dillon Mesa
6202	Stevens Creek
6203	Beaver Creek
6300	Sheeps Gulch
6301	Cabin Creek
6302	Alder Creek
6305	Woods Gulch
6306	Wanita Hot Springs
6309	Tomichi Dome
6318	Camp Kettle
6320	Big Draw
6325	Mill Hill
6326	Snyder Gulch
6327	Vouga Reservoir
6328	Rock Creek
6329	West Pass Creek
6342	Dome
6346	Cochetopa Creek
6362	Cold Springs
6400	Jacks Cabin
6401	Flat Top
6505	Chuchuru Brothers
6510	Paughkeepsie
6999	Sargents
8903	Price Brothers

APPENDIX RM-6

APPENDIX RM-6

RESEARCH BASIS FOR DEVELOPMENT OF THE PROPOSED SPRING REST SCHEDULE

The rest schedule proposed in the MFP/Spring Rest Alternative is a product of the Management Framework Plan (MFP), and is a unique method of displaying limitations and restrictions placed on grazing systems to be developed following the planning process. The proposed rest schedule is an abstract of several papers and published articles on the effects of livestock grazing.

In general, the three critical periods in the growth of perennial grass plants during which grasslands would benefit from rest are (Scott 1955):

1. Spring, when plants are drawing on their stored reserves,
2. Summer, when most of the plants are flowering and producing seed, and
3. Autumn, when carbohydrates are transported to the stem bases and roots for storage.

The purposes of resting plants are (Hormay 1970):

1. To allow plants opportunity to make and store food--to recover vigor,
2. to allow seed to ripen,
3. to allow seedlings to become established, and
4. to allow litter to accumulate between plants.

A number of studies on the effects of defoliation on plant vigor, production, and carbohydrate reserves have established that frequency, intensity, and season of defoliation can explain most plant responses to defoliation (Goodall, Perry, et al. 1978). In general, too heavy, too early, or too frequent grazing or defoliation resulted in declining vigor of vegetation (Hendrick 1958).

Trlica and Cook (1971-72) found that severe defoliation of numerous semi-arid range species was especially detrimental if defoliation occurred when plants were rapidly replenishing their reserves. Cook (1966) found that translocation and storage of reserves generally are most active in the autumn when plants are completing their annual cycle. Respiration during the winter and the production of spring growth together may consume from 47 to as much as 75 percent of the carbohydrate reserves accumulated during the previous autumn. He also states that when plants approach maturation, carbohydrate storage reaches its peak. In cool weather grasses, peaks in carbohydrate storage are often reached in early summer as the plants mature. He indicated that if the plant is defoliated in early growth, food manufacture is nil until new growth restores the photosynthetic tissue. In this case, the plant must draw again upon reserves or grow at a slower rate within the ability of the remaining photosynthetic tissues to furnish food.

Cook notes that in general, any situation that interferes with normal growth of the photosynthetic tissues of range plants will restrict development of the roots and normal reserve storage and curtail subsequent growth. The effects of grazing upon carbohydrate levels to be reached at the end of the growing season depends upon the number of times the plant is grazed and the proportion of the photosynthetic tissue allowed to remain after each grazing. The more frequent and more intense grazing treatments reduce the number of roots and rhizomes and the percent of food reserves present. Cook believes a plant that prolongs replenishment of the reserve following initial spring growth is more susceptible to grazing stress during the growing period than one that replenishes its reserve rapidly following initial growth. Desert plants will not tolerate heavy and continuous spring use because they do not have an opportunity for regrowth and carbohydrate replenishment during the dry summer.

Cook concludes that since species of plants vary greatly in the extent of depletion of carbohydrate reserves during spring growth and in the rate and period of replenishment, it is impossible to perfect a method of grazing that will benefit all plants in the same manner. Plants intensively used should have a period of rest for restoration of the reserve level, and plants on an unfavorable site should be used conservatively or during seasons when the effects will be least harmful.

Sagebrush-grass ranges can be improved by proper grazing rather than by costly spraying, burning, or mechanical treatments. Spring deferment combined with heavy grazing in the late fall offers an alternative method of improvement. The loss of grazing in the spring is more than offset by the increased grazing rate allowable in the fall (Laycock 1967).

Meuggler (1950) concluded: (1) heavy stocking in the fall will not markedly affect grass and forb production, it may cause a decrease in shrubs if they are heavily utilized, (2) heavy spring stocking will severely reduce grass and forb production and greatly increase the abundance of undesirable shrubs, (3) range in poor condition will improve very slowly if it is continually grazed in the spring at even a light stocking rate, (4) it would appear that well-planned rotation system of grazing in which areas in poor condition are grazed only in the fall is one method of improving sagebrush-grass range without necessitating a heavy reduction in stocking.

Launchbaugh, Owensby, Schwartz, and Carch (1978) reported: "The major requirement of range plants is to maintain carbohydrate reserves within critical limits, but principles regulating plant-defoliation responses remain unclear (Heady 1975). Some recover faster than others from overuse, necessary in seasonal rotations (Gomm 1969), while others only tolerate conservative grazing (Perry and Chapman 1975). Also, isolating grazing and weather effects may be difficult (Arnold 1955). Since photosynthate production exceeds plant needs, most range species are adapted to growing-season use, maximum defoliation that maintains desired production levels must be sought (Heady 1975). A standard proper-use percentage becomes meaningless as demonstrated on blue grama range (Bement 1969). Also, when range is intensively grazed until midseason, animals seldom keep pace with forage production or prevent otimum end-of-season food storage (Ownesby et al. 1975). If regrowth goes dormant before food reserves are replenished, late-season overgrazing reduces plant vigor more than does earlier overuse (Parker 1960). Specialized systems that disregard plant needs reduce future yields (Cook 1966). Seasonal rest-rotations cannot be effectively geared to short, infrequent forage growth opportunities nor to one brief growth period (McIlvain 1974)."

Launchbaugh et al. also noted: "Specialized rotation systems are used to prevent grazing during the growing season on the premise that animals graze selectively. They eventually kill desirable vegetation, which is replaced by unpalatable plants. Periodic 'resting' is recommended to restore carbohydrate reserves (Hormay 1970, Kothmann 1975), improve vigor (Heady 1975) and produce seed. Resting may expedite range recovery, yet is generally unnecessary for maintaining plant vigor (Lewis 1969), and range condition can be weakly correlated with grazing pressure. The 'seed theory of range improvement' is baseless (Hyder et al. 1975).

Heady also states that a good grazing system should: "(1) take into account plant physiology and life history, (2) be suited to kinds of plants present, (3) be adapted to soil conditions to preclude puddling, (4) improve range condition and forage production by favoring desired plants, (5) not be detrimental to animal gains, and (6) be practical to implement in a ranching operation." Heady feels that the objectives sought in a good grazing system are: "(1) restoration of forage plant vigor, (2) allowing plants to produce seed, (3) heavier and more uniform utilization, and (4) increased animal production."

At present, little research is available for determining the minimum rest required for key forage species within the EIS area. However, the grazing schedules proposed would be ammended as new literature and data become available. Also, very little research has been undertaken to determine the minimum rest required for aquatic riparian habitat (Meehan and Platts 1978). Research has shown removal of livestock grazing drastically changed the appearence of the entire stream environment (Van Velson 1978, Keller, Anderson, and Tappel 1978). Starch (1978) reported that with complete rest from livestock grazing for four years, conditions of the vegetation and stream banks within the exclosure had improved dramatically so that livestock were then permitted to graze within the protected area in late summer. This practice has since been continued annually with no apparent change in fish habitat and population. This study failed to note the amount of use (utilization and trampling) presently being imposed on the vegetation and stream banks (light, moderate, or heavy).

Again, when literature and data become available through research, and should the objectives of the MFP not be met, the proposed grazing schedule would be ammended.

APPENDIX RM-7

APPENDIX RM-7

MAXIMUM ACRES FOR TREATMENT BY RANGE SITE: MFP/SPRING REST ALTERNATIVE AND FALL REST ALTERNATIVE

Allotment	Treatment (total acres)	Dry Mountain Loam (acres)	Mountain Loam (acres)	Deep Clay Loam (acres)	Mountain Outwash (acres)	Pine Grass-land (acres)	Sub-Alpine Loam (acres)	Mountain Swale/ Mountain Meadow (acres)
6011	380	150					230	
6027	70						70	
6033	320						320	
6034	80		80					
6056	217	217						
6100	2,315		2,200					115
6101	6,800		6,800					
6103	700					500	200	
6104	1,770	150				1,300	320	
6105	538					538		
6107	10,000	5,000					4,000	1,000
6117	560	160				400		
6150	240						240	
6200	200	100					100	
6202	50				50			
6203	6,000	5,600					400	
6204	400	400						
6207	400					400		
6208	1,400	1,400						
6213	290			190			100	
6216	700	700						
6300	3,400	2,400					700	300
6301	9,000	8,800						200
6302	4,000	3,150	750				100	
6304	2,000	1,120	750					130
6305	3,000	2,850						150
6306	250	120	130					
6309	1,800	1,800						
6311	3,800	3,200						600
6312	11,300	10,000						1,300
6313	180		180					
6316	1,520	1,500						20
6317	8,700	8,000			200			500
6318	3,000		1,000				1,825	175
6320 & 6360	1,100	1,100						
6323	600	400			100			100
6325	850	590	260					
6326	600	600						
6327	1,600	700					900	
6328	1,160		680				480	
6329	1,670		150		900		620	
6338	860	600					260	
6343	2,200		2,200					
6347	900				900			
6353	150						150	
6400	20						20	
TOTAL	97,090	60,807	15,180	190	2,150	3,138	11,035	4,590

APPENDIX RM-7

MAXIMUM ACRES FOR TREATMENT BY RANGE SITE: ELIMINATION OF LIVESTOCK GRAZING ALTERNATIVE

Allotment	Treatment (total acres)	Dry Mountain Loam (acres)	Mountain Loam (acres)	Mountain Outwash (acres)	Subalpine Loam (acres)
6003	143		143		
6004	153		153		
6005	580		580		
6018	96				96
6056	496		496		
6103	638				638
6104	319				319
6111	920				920
6128	1,855			1,105	750
6150	237				237
6300	4,627		1,972		800
6301	1,478	1,478			
6303	430	430			
6304	1,007	597	410		
6313	181		181		
6315	265				265
6317	12,900	12,900			
6318	1,892				1,892
6324	392			392	
6327	219	219			
6329	1,583			1,016	567
6342	2,393		276	2,126	
6343	400			400	
6348	1,429			1,429	
6357	329			329	
6360	45			45	
6372	1,108				1,108
6374	404			200	205
6375	150			150	
TOTALS	34,824	13,927	5,908	7,192	7,797

APPENDIX RM-7

MAXIMUM ACRES FOR TREATMENT BY RANGE SITE: OPTIMIZE WILDLIFE AND WATERSHED VALUES ALTERNATIVE

Allot.	Treatment (total acres)	Dry Mountain Loam (acres)	Mountain Loam (acres)	Deep Clay Loam (acres)	Mountain Outwash (acres)	Pine Grass-land (acres)	Sub-Alpine Loam (acres)	Shallow Sub Alpine Loam (acres)	Mountain Swale/ Mountain Meadow (acres)
6003	143		143						
6004	153		153						
6010	923						923		
6011	448		448						
6016	414						414		
6017	19	19							
6018	155						96		59
6026	82		82						
6027	71						71		
6029	24						24		
6030	35						35		
6033	274						263		11
6034	339		321						18
6037	183						183		
6050	10								10
6051	4						4		
6054	64						64		
6055	247						211		36
6056	905	409	496						
6100	2,176					2,176			
6101	7,831		7,831						
6103	638						638		
6104	4,934					4,615	319		
6107	19,371	12,965					5,668	738	
6108	1,449					503		946	
6111	985						920		65
6112	2,240						769	1,471	
6114	66		66						
6128	1,855				1,105		750		
6150	237						237		
6180	434					262		112	60
6200	165						165		
6202	1,354				47		964		343
6203	436						436		
6204	401	401							
6205	76	76							
6210	77	77							
6213	281			187			94		
6216	1,427	1,427							
6300	3,089		1,972				800		317
6301	7,447	6,154					1,293		
6302	2,039	1,959					80		
6303	430	430							
6304	3,086	2,211	745						130
6306	130		130						
6308	47								47
6309	12								12
6312	3,539	3,539							
6313	181		181						
6315	265						265		

APPENDIX RM-7

MAXIMUM ACRES FOR TREATMENT BY RANGE SITE: OPTIMIZE WILDLIFE AND WATERSHED VALUES ALTERNATIVE (continued)

Allot.	Treatment (total acres)	Dry Mountain Loam (acres)	Mountain Loam (acres)	Deep Clay Loam (acres)	Mountain Outwash (acres)	Pine Grass-land (acres)	Sub-Alpine Loam (acres)	Shallow Sub Alpine Loam (acres)	Mountain Swale/ Mountain Meadow (acres)
6316	541	523							18
6317	13,690	12,900							790
6318	8,067	5,998					1,892		177
6323	380				300				80
6324	412			20	392				
6325	9				9				
6326	1,125	1,125							
6327	1,655	692		50			913		
6328	113		23				90		
6329	1,583				1,016		567		
6338	269		10				259		
6339	79				79				
6342	2,304		138		2,126		40		
6343	1,857		1,106		400		351		
6344	303	292					11		
6346	125						125		
6347	939				939				
6348	1,429				1,429				
6350	1,082				1,082				
6353	170						70		100
6356	329				329				
6360	45				45				
6365	26				26				
6369	133				10		123		
6370	397				397				
6371	360				210		150		
6372	1,178		347				831		
6373	45				45				
6374	835	630					205		
6375	353				150		203		
6400	19						19		
6401	370						300		70
6402	45								45
TOTALS	111,458	51,827	14,192	257	10,136	7,556	21,835	3,267	2,388

APPENDIX RM-7

MAXIMUM ACRES FOR TREATMENTS BY RANGE SITE: OPTIMIZE LIVESTOCK GRAZING ALTERNATIVE

Allotment	Treatment (Total Acres)	Dry Mountain Loam (Acres)	Mountain Loam (Acres)	Deep Clay Loam (Acres)	Mountain Outwash (Acres)	Pine Grassland (Acres)	Sub-Alpine Loam (Acres)	Mountain Swale/ Mountain Meadow (Acres)	Shallow Sub-Alpine (Acres)
5209	579	579							
6010	3,135	2,212					923		
6011	381	150					231		
6015	34	34							
6016	414						414		
6017	19	19							
6027	71						71		
6029	19						19		
6033	319						319		
6034	97		97						
6037	183						183		
6055	247						211	36	
6056	728	728							
6100	11,710		9,419			2,176		115	
6101	6,831		6,468				363		
6103	1,275					1,079	184	12	
6104	3,082	155				2,594	319	14	
6105	4,429					4,429			
6107	52,907	47,849					4,058	1,000	
6108	1,650					1,059			591
6111	280		280						
6112	490								490
6116	61						61		
6117	562	158				404			
6120	474					474			
6123	336					336			
6150	237						237		
6202	6,285	6,238			47				
6203	6,074	5,670					404		
6204	401	401							
6205	76	76							
6206	2,501	2,501							
6207	426					426			
6208	2,848	2,848							
6210	1,504	1,504							
6213	281			187			94		
6300	7,843	4,865	1,972				689	317	
6301	9,476	8,684					591	201	
6302	9,650	8,815	755				80		
6303	337	337							
6304	2,040	1,165	745					130	
6305	3,327	3,176						151	
6306	514	383	131						
6309	2,863	2,851						12	
6310	1,094	1,094							

APPENDIX RM-7

MAXIMUM ACRES FOR TREATMENTS BY RANGE SITE: OPTIMIZE LIVESTOCK GRAZING ALTERNATIVE
(continued)

Allotment	Treatment (Total Acres)	Dry Mountain Loam (Acres)	Mountain Loam (Acres)	Deep Clay Loam (Acres)	Mountain Outwash (Acres)	Pine Grassland (Acres)	Sub-Alpine Loam (Acres)	Mountain Swale/ Mountain Meadow (Acres)	Shallow Sub-Alpine (Acres)
6311	4,301	3,173					528	600	
6312	22,745	21,447						1,298	
6313	181		181						
6314	57	57							
6315	20							20	
6316	3,164	3,146						18	
6317	5,074	4,328			200			546	
6318	7,915	4,834	1,012				1,892	177	
6323	1,045	845			120			80	
6324	21			21					
6325	853	581	263		9				
6327	913						913		
6328	1,161		682				479		
6329	1,672	143			906		623		
6338	873	614					259		
6343	2,673		2,211				462		
6344	205						205		
6353	598	528					70		
6360	375	360			15				
6400	19						19		
TOTAL	201,955	142,548	24,216	208	1,297	12,977	14,901	4,727	1,081

APPENDIX RM-8

APPENDIX RM-8

RANGE IMPROVEMENTS BY ALLOTMENT -- ALL ALTERNATIVES 1/

Allotment Number	Name of Allotment	Springs		Miles Fence	Miles Pipeline	Wells	Cattle Guards	Reservoirs		Miles Trails	
		2/	3/	2/	2/	2/	2/	3/	2/	2/	3/
6001	Goose Creek	2		3			4		2		
6011	Willow Creek	3					2		1		
6017	Newberry						1				
6027	Antholz						2				
6029	Howell	1									
6030	Masden						1				
6031	Alpine Plateau	4		3			1				
6032	Blue Mesa	3		2			2				
6033	Willow Creek - AMP	1	1				1	1			
6034	Little Willow	2					2				
6037	Windy Point			3							
6040	Butte Rock						1	1			
6050	Mauer Blue Canyon			2			2				
6051	Nicolas Big Blue			1			1				
6052	Nicolas Big Park			1			1				
6053	Cox Park						2				
6056	Highway			5							
6100	Ten Mile Spring	3		4			4		2		
6101	Sapinero	3		2			3		2		
6102	Powderhorn									7	
6103	Indian Creek			1		1					
6104	Powderhorn - AMP			4.5		12				5	5
6105	Yeager Gulch			6							
6106	Huntsman Mesa	2					2				
6107	Iola-Powderhorn	10	10	5			4	4			
6108	Park Creek	3		1		2	5		2		
6109	Monuments	4		9			8		2		

1/ Under the Elimination of Livestock Grazing Alternative the only facilities constructed would be springs listed under the No Action Alternative and the Optimize Wildlife and Watershed Values Alternative.

2/ Range improvements under the MFP/Spring Rest Alternative, the Fall Rest Alternative, and the Optimize Livestock Grazing Alternative.

3/ Range Improvements under the No Action Alternative and the Optimize Wildlife and Watershed Values Alternative.

APPENDIX RM-8

RANGE IMPROVEMENTS BY ALLOTMENT -- ALL ALTERNATIVES 1/
(continued)

Allotment Number	Name of Allotment	Springs		Miles Fence	Miles Pipeline	Wells	Cattle Guards	Reservoirs		Miles Trails	
		2/	3/	2/	2/	2/	2/	3/	2/	2/	3/
6111	Cathedral	4		8		2	4		1		
6112	Cebolla Creek	4	4	2.3		4					
6115	Devils Lake									2	
6116	Ute Trail	2		2							
6117	Lone Pine	4		2			2		1		
6120	Red Ride	2									
6123	Fourth of July	1									
6125	J.S. Ward	1		1							
6127	Lake Fork	2		1							
6128	Friends Creek	2									
6129	Waterdog Lake			3							
6130	Campbell Creek	1									
6131	Hells Canyon	1									
6150	Round Mountain	5	5	1							
6180	Rock Creek			1			1			1	
6202	Stevens Creek	8		10	3	3	6		4		
6203	Beaver Creek	12		11	3	2	10		2		
6204	Stuben Creek	1	1	3			1	1	1		
6205	Spann			1			2		1		
6206	Blinberry Gulch	2	2	8			4	2	3		
6207	West Antelope	1	1				2	2			
6208	West Antelope Creek	2	2				2				
6210	Antelope Creek	1	1	3		2	2				
6212	Towner	2	1				2		1		
6213	Mill Creek	1					1				
6216	Antelope Creek	3		2			2		1		
6300	Sheeps Gulch	4					2		2		
6301	Cabin Creek	10	10	7	5	3	7	7	3		
6302	Alder Creek	2	2	11	7	1	8		3		
6303	Line Spring	2					2				
6304	Doyleville Group	2		2	2	1	3	3	3		
6305	Woods Gulch	1	1				6	2	1		
6306	Waunita Hot Springs	2	1	2			2				
6307	Taylor Park						1				
6308	Hot Springs						2				
6309	Tomichi Dome	2	2	3	4	3	5	5			

APPENDIX RM-8

RANGE IMPROVEMENTS BY ALLOTMENT -- ALL ALTERNATIVES 1/
(continued)

Allotment Number	Name of Allotment	Springs		Miles Fence	Miles Pipeline	Wells	Cattle Guards	Reservoirs		Miles Trails	
		2/	3/	2/	2/	2/	2/	3/	2/	2/	3/
6310	Plesent View	1	1		2		2		3		
6311	Gold Basin	2	2		7	1					
6312	Lower Cochetopa	2		6		2	6				
6313	Stubbs Gulch	2					4				
6314	Holly-Cochran						2				
6315	Upper Means	2					2		2		
6316	Dead Creek	3			1	1	3				
6317	South Parlin Flats	8	4	9		2	8	8	2		
6318	Camp Kettle	3	3	8		11	8	1	2		
6320	Big Draw	3	3	2		1	5	5			
6323	Barrett Creek	2	2	3	2		1	1			
6324	Hoover			2			3				
6325	Mill Hill	2		2			3				
6326	Snyder Gulch	2		2	1	2	4		2		
6328	Rock Creek						1	1			
6329	West Pass Creek	8		6		2	6		2		
6338	Muddy-Poison	2					2		1		
6342	Dome			1		2					
6343	Poison Gulch	2	2	2		2	3	3			
6344	Trail Creek	2					2				
6346	Cochetopa Creek								1		
6347	Monchego A			1			2				
6348	Texas Creek	2		3	2		4		1		
6349	Mesa			1			2				
6350	Van Tassel	1					3	3	2		
6353	Lower Means	2	2				2		1		
6354	Vouga Res.-Exch. (6327)										
6356	Doyleville Rd. (6329)										
6357	Meaker (6329)										
6358	Doyleville (6999)										
6359	Baxter						2				
6360	Big Draw						2				
6361	Monchego (6347)										
6362	Cold Springs						2		1		
6365	Barrett Creek						1				
6366	Hot Springs (6308)										
6369	Dry Creek (6329)										

APPENDIX RM-8

RANGE IMPROVEMENTS BY ALLOTMENT -- ALL ALTERNATIVES 1/
(continued)

Allotment Number	Name of Allotment	Springs		Miles Fence	Miles Pipeline	Wells	Cattle Guards	Reservoirs		Miles Trails	
		2/	3/	2/	2/	2/	2/	3/	2/	2/	3/
6370	Archuleta (6329)										
6371	Shearing Plant (6329)										
6372	Alkali Creek (6328)										
6373	South Homestead (6329)										
6374	Reservoir (6344)										
6375	Shearing Plant (6329)										
6999	Sargents-Unallotted			2		1					
6500	Wade Gulch	2		10			2		1	1	
6502	Red Cloud									2	
6503	Porter									1	
6504	Hanson Creek									2	2
6505	Chuchuru Brothers									3	3
6506	Burrough Peak Park									2	
6507	American Flats									1	
6508	Mill Gulch									2	
6509	American Lake									1	
6510	Poughkeepsie									2	
8900	Cement Creek									4	4
8902	Eureka									3	3
8903	Price Brothers									2	2
8905	Cunningham Gulch									2	2
8906	Molas Lake									3	
8907	Deer Park									2	2
	TOTALS	181	63	196.8	39	63	215	50	59	48	23

APPENDIX RM-9

APPENDIX RM-9

RESEARCH BASIS FOR DEVELOPMENT OF THE PROPOSED FALL REST SCHEDULE

The fall rest schedule described in Chapter 2 is constructed around the assertion that grazing in the pre-dormancy period of plants is the most detrimental period of use. The premises which this assertion are based on are as follows:

1. The period after flowering and before dormancy (the pre-dormancy period) is the time when most plants are rapidly accumulating carbohydrate reserves, which were lowered during the earlier growth and flowering periods.
2. Defoliation late in the season causes plants to enter dormancy at a lowered carbohydrate reserve level, unless sufficient time is available for regrowth.
3. The more regrowth which occurs after defoliation and before dormancy, the higher the carbohydrate reserve level will be as the plant enters dormancy.

From these premises, it can be seen that late season defoliation is most detrimental because insufficient time remains for regrowth and subsequent restoration of carbohydrate reserves before dormancy. Summer grazing is the next most detrimental period, followed by spring grazing, and grazing during plant dormancy, which is the least harmful period of use. In the rest schedule, periods of late season use are followed in subsequent years by rest at earlier periods. This is to periodically allow time for regrowth and restoration of carbohydrate reserves in the grazing cycle.

The findings of numerous researchers support the premises which are the foundation of the fall rest schedule (stated above). The specific research which supports each premise will be discussed and summarized below. Most of the literature references are based on clipping studies rather than grazing studies. A discussion of the differences between grazing and clipping and the validity of clipping studies is at the end of this section.

Premise # 1

The period after flowering and before dormancy (the pre-dormancy period) is the time when plants are rapidly accumulating carbohydrate reserves which were lowered during the earlier growth and flowering periods.

McCarty (1938) stated that the concentration of carbohydrate reserves in both herbage and basal organs of grasses is inversely related to the rate of herbage growth. The accumulation of carbohydrate reserves is delayed, therefore, until most of annual herbage is produced (late in the season).

Weinmann (1961), in a literature survey of the seasonal trends of carbohydrate storage in grasses, found that TAC (total available carbohydrate) changes in the storage organs show, in general, a similar pattern in most species of grasses: TAC decrease in both concentration and amount during the formation of new shoots, more particularly during spring, and increase during maturation, which is indicative of their function as "reserve substances". Weinmann noted that in a few instances no typical seasonal changes were detected, which could be due to imperfections in the sampling procedure or in the growth habit and behaviour of the species concerned. (Woods et al. 1955; Daitz 1954; Barnes 1960; Weinmann and Goldsmith 1948; Hiepko 1959; Thaine 1954; Neiland and Curtis 1956; Weinmann 1946, 1947, 1948) in Weinmann 1961.

Mooney and Billings, in a study of the seasonal carbohydrate reserve fluctuations of three alpine plants (*Saxifraga rhomboidea*, *Polygonum bistortoides*, and *Geum turbinatum*) found that at fall dormancy the carbohydrate content is at a very high level in the underground storage organs. Early shoot growth utilizes considerable quantities of storage reserves. After this period there is a rapid accumulation of reserves in rhizomes and roots, reaching a peak again late in the alpine growing season. All of this activity was condensed into a period of a relatively few weeks.

McConnell and Garrison (1966) in a study of the seasonal variations of available carbohydrates in bitterbrush, found that carbohydrate reserves declined during the early growing season and remained at a relatively low level during flowering, rapid twig growth, and seed formation stages. After seed formation, reserves began to accumulate and build up markedly until leaf fall.

Cook (1966) stated that in general, the normal trend of seasonal carbohydrate balance in the storage organs is similar for most perennial plants. In the majority of species, the minimum reserves in the storage organs occur during early vegetative growth. After initial growth has produced considerable leaf area, carbohydrates are synthesized in excess of growth requirements. At this time some plant species slowly begin to replenish the reserves, while in other species the reserve remains at a relatively low level until the later stages of maturation. When plants approach maturation, carbohydrate storage reaches its peak.

Additional references which support Premise # 1 are as follows: Donart (1969); Kinsinger and Hopkins (1961); Welch (1968).

Premise # 2

Defoliation late in the season causes plants to enter dormancy at a lowered carbohydrate reserve level, unless sufficient time is available for regrowth.

Trlica and Cook (1971), in a study of the defoliation effects on the carbohydrate reserves of eight desert species (*Artemisia tridentata*, *Artemisia arbuscula* var. *nova*, *Atriplex confertifilia*, *Atriplex falcata*, *Eurotia lanata*, *Oryzopsis hymenoides*, *Stipa comata*, and *Sitanion hystrix*) found that autumn reserve storage decreased as the time between defoliation treatment and normal quiescence (dormancy) lessened. Plants which were defoliated during rapid growth (about May 10) or near maturity (about July 1) had little regrowth and consequently had little photosynthetic tissue present for carbohydrate sunthesis during late summer; whereas plants which were defoliated during quiescence (about November 12) the previous year, or during early growth (about April 1) had more regrowth and greater carbohydrate storage by quiescence.

In an unrelated study, Trlica and Cook (1972) found that when Russian wildrye (*Elymus junceus*) and crested wheatgrass (*Agropyron cristatum*) were defoliated during quiescence the previous year, or during early growth the same year, only small reductions in autumn TAC (total available carbohydrates) storage occurred. However, when the plants were clipped at anthesis (peak flowering) and again at maturity, substantial reductions in autumn TAC shores occured. Plants from these three treatments had little chance for regrowth before autumn frosts and consequently had little photosynthetic tissue for carbon dioxide assimilation and carbohydrate storage during the normal storage period.

McCarty (1938) in a study of the relation of growth to the varying carbohydrate content in mountain brome, stated that continuous heavy grazing at or after seed maturity during the autumn storage period, would not only prevent normal storage of carbohydrates, but would also stimulate further herbage growth. This stimulated growth would be produced at the expense of the carbohydrates already stored, resulting in further depletion of carbohydrates, and the plant would enter the winter period with diminished stores.

Owensby et al. (1970), in a study of the effect of burning and clipping on big bluestem (*Andropogon gerardi*) reserve carbohydrates, stated that the later in the growing season that clipping occurred, the lower were reserves for use during winter dormancy and subsequent spring regrowth.

Several researchers have found that fall cutting of alfalfa can kill or injure the plants because of loss of ability to harden and of freezing tolerance. Such harvests remove the plant's leaf area, which is important in the synthesis of carbohydrates. Later regrowth draws on energy reserves that cannot be replenished in the time left before winter dormancy. Plants low in energy reserves may develop a lower level of winter hardiness than plants high in reserves (Smith 1964; Levitt 1972; Grandfield 1935; Mark 1936; in Voight 1975).

Additional references which support Premise # 2 are the following: McCarty and Price (1942); Mueggler (1967); Reynolds and Smith (1962).

Premise # 3

The more regrowth which occurs after defoliation and before dormancy, the higher the carbohydrate level will be as the plant enters dormancy.

In a study of the response of mountain grassland vegetation to clipping at different times in the growing season, Mueggler (1967) found that the species were most harmed by clipping during the period from flower stalk formation to seed ripening. Mueggler's findings also supported those of McCarty and Price (1942) for *Bromus carinatus*, *Agropyron trachycaulum*, and *Geranium viscosissimum* in the mountains of Utah. They determined that the harmful period was just prior to and during the early part of the period when the plants stored carbohydrates in their roots and crowns. Adequate storage of carbohydrates at the beginning of dormancy is essential to survive the dormant period and to sustain the first flush of growth in the spring. Removal of foliage too late in the season to allow substantial regrowth prior to the storage period and too early for adequate storage to take place before the onset of dormancy is most harmful (McCarty and Price 1942; in Mueggler 1967).

In a study of the effects of herbage removal at various dates on the vigor of bluebunch wheatgrass (*Agropyron spicatum*) and arrowleaf balsamroot (*Balsamorhiza sagittata*), Blaisdell and Pechanec (1949) found that as clippings were made later and later in the growing season, there was less and less opportunity for regrowth and subsequent photosynthesis. This trend continued until, toward the end of the growing season, no regrowth was possible. Clipping at this time left the plant with no means of supplementing its food stores during the period when most of the storage normally takes place. Thus, after the date when substantial regrowth is impossible, and before maturity, complete herbage removal can be expected to most seriously impair plant vigor (Blaisdell and Pechanec 1949).

Cook (1971) and Trlica and Cook (1971) conducted a study of the effects of season of defoliation on the vigor and carbohydrate reserves of several desert plant species. They found that greatest reductions in autumn carbohydrate levels of the studied species were found when defoliation occurred during rapid growth about May 1 or when plants approached maturity about July 1. The more regrowth attained by a species after defoliation, the greater the carbohydrate reserve replenishment.

In contrast to the above findings, Donart and Cook (1971) found that defoliation of both grasses and forbs early in the season when carbohydrate reserves are low is considerably more detrimental than defoliation late in the season when carbohydrate reserves are high if, however, there is ample opportunity for regrowth before fall dormancy occurs. This reaffirms the importance of regrowth to restore depleted carbohydrate levels. An important criterion in this study is that defoliation in the late season did not occur until after reserves had been restored. Thus, the plants were at maximum vigor. Defoliation while the plants were actively restoring the reserves probably would have been more harmful.

Trlica and Cook (1972), in a study of the influences of development and defoliation on carbohydrate reserves of crested wheatgrass and Russian wildrye, concluded that autumn reserve stores were directly related to the amount of new growth produced after being defoliated.

Effects of Grazing vs. Clipping

The majority of the literature support cited in this appendix is based on clipping studies rather than actual grazing studies. Clipping, however, is a valid technique to reflect the general physiological response of plants to grazing. The actual effects of clipping on range plants may be more or less detrimental than grazing, depending on circumstances, according to White (1973). Grazing may be more detrimental than clipping if selective grazing removes all herbage from some plants and not others, because ungrazed plants take available nutrients and water away from grazed plants. However, grazing may be less detrimental than clipping if grazing leaves ungrazed tillers on a plant while removing others, thus allowing for the transfer of carbohydrates from ungrazed to grazed tillers. McKendrick and Sharp (1970) pointed out that plant responses may result from soil moisture effects from soil compaction by livestock. These responses would not be evident in clipping studies.

APPENDIX RM-10

APPENDIX RM-10

DIETARY OVERLAP OF WILDLIFE AND LIVESTOCK BY PERCENT OF VEGETATIVE TYPE

	Overlap: Vegetation Type:	40% Riparian		26% Sagebrush		81% Timber		Production AUMs		Overlap AUMs	
Allotment	P. L. Acres	Acres	%	Acres	%	Acres	%	LS	WL	LS	WL
5209	642	0	0	642	100	0	0	0	35	0	9
6000	33	0	0	33	100	0	0	1	2	0	1
6001	2,941	5	0	2,696	92	240	8	280	398	85	121
6003	539	3	1	416	77	120	22	22	75	8	29
6004	332	0	0	172	52	160	48	13	47	7	25
6005	580	18	3	0	0	562	97	21	70	17	56
6006	478	6	2	432	90	40	8	47	16	15	6
6007	462	9	2	363	79	90	19	47	15	17	6
6008	541	0	0	391	72	150	28	17	77	7	32
6009	37	3	8	34	92	0	0	3	0	1	0
6010	2,325	1	0	2,124	91	200	9	47	48	15	15
6011	1,075	8	1	1,067	99	0	0	187	22	49	6
6013	302	15	5	0	0	287	95	14	38	11	30
6014	20	0	0	0	0	20	100	4	3	4	3
6015	73	0	0	33	45	40	55	6	1	3	1
6016	607	12	2	355	58	240	40	25	98	12	47
6017	46	6	13	40	87	0	0	15	1	4	0
6018	3,376	45	1	0	0	3,331	99	75	128	60	103
6019	198	0	0	0	0	198	100	0	6	0	5
6021	268	0	0	0	0	268	100	15	13	12	11
6022	35	0	0	35	100	0	0	8	0	2	0
6024	639	15	2	0	0	624	98	8	70	6	56
6026	98	0	0	98	100	0	0	7	11	2	3
6027	225	0	0	0	0	225	100	12	13	10	11
6029	165	0	0	0	0	165	100	9	10	7	8
6030	100	1	1	0	0	99	99	10	8	8	6
6031	2,544	6	0	0	0	2,538	100	187	122	151	99
6032	1,739	8	1	231	13	1,500	86	206	224	151	165
6033	3,428	31	1	137	4	3,260	95	500	136	392	107
6034	1,092	3	0	989	91	100	9	101	52	31	11
6036	40	0	0	40	100	0	0	8	1	2	0
6037	491	6	1	485	99	0	0	19	16	5	4
6040	326	0	0	0	0	326	100	31	24	25	19
6050	1,492	43	3	0	0	1,449	97	272	114	114	91
6051	632	2	0	0	0	630	100	13	56	11	45
6052	1,536	23	1	0	0	1,513	99	16	96	13	77
6053	938	1	0	0	0	937	100	102	58	83	47
6054	945	18	2	0	0	927	98	21	38	17	30
6055	2,074	23	1	1,451	70	600	29	94	80	40	34
6056	2,512	27	1	2,005	80	480	19	62	109	25	40
6060	714	0	0	294	41	420	59	0	36	5	16
6061	428	1	0	0	0	427	100	52	4	42	3
6062	2,342	8	0	134	6	2,200	94	0	71	0	55
6100	15,329	51	0	11,478	75	3,800	25	1,089	1,130	430	449
6101	8,101	34	0	7,987	99	80	1	684	570	182	151
6102*	4,022	43	1	1,299	32	760	19	347	384	111	102
6103	18,714	193	1	16,821	90	1,700	9	800	774	249	241
6104	28,799	344	1	1,655	6	26,800	93	1,200	1,757	927	1,358
6105	7,206	53	1	2,353	33	4,800	66	646	319	403	199
6106	1,238	9	1	729	59	500	40	104	38	50	18
6107	109,851	615	1	11,386	10	97,850	89	9,383	4,823	7,046	3,622
6108	10,069	66	1	903	9	9,100	90	883	226	668	171
6109	6,908	53	1	1,155	17	5,700	82	400	546	285	389
6111	4,290	8	0	1,482	35	2,800	65	238	250	147	154

DIETARY OVERLAP OF WILDLIFE AND LIVESTOCK BY PERCENT OF VEGETATIVE TYPE (continued)

	Overlap:	40%		26%		81%		Production		Overlap	
	Vegetation Type:	Riparian		Sagebrush		Timber		AUMs		AUMs	
Allotment	P. L. Acres	Acres	%	Acres	%	Acres	%	LS	WL	LS	WL
6112	6,477	15	0	3,862	60	2,600	40	327	399	157	192
6113	59	0	0	59	100	0	0	5	8	1	2
6114	144	0	0	144	100	0	0	11	19	3	2
6115**	7,075	78	1	2,337	33	3,700	52	538	465	322	278
6116	747	2	0	45	6	700	94	37	64	29	50
6117	1,070	6	1	824	77	240	22	56	47	21	18
6120	902	0	0	822	91	80	9	64	31	19	10
6123	498	0	0	0	0	498	100	9	4	7	3
6125	97	0	0	0	0	97	100	8	2	6	2
6127	1,784	18	1	266	15	1,500	84	44	87	32	63
6128	1,973	6	0	567	29	1,400	71	118	56	77	36
6129	461	5	1	0	0	456	99	10	4	8	3
6130	85	8	9	0	0	77	91	5	5	4	4
6131	723	15	2	0	0	708	98	32	36	26	29
6132	22	22	100	0	0	0	0	5	1	2	0
6133	1,726	12	0	64	4	1,650	96	0	42	0	33
6134	3,490	95	3	0	0	3,395	97	0	386	0	308
6150	297	9	3	248	84	40	13	17	20	6	7
6180	1,987	52	3	335	17	1,600	80	58	63	41	44
6200	2,358	19	1	2,299	97	40	2	114	282	31	77
6201	85	0	0	85	100	0	0	5	11	1	3
6202	9,267	126	1	8,341	90	800	9	607	1,113	189	346
6203	9,270	73	1	7,277	78	1,920	21	538	608	203	229
6204	401	0	0	401	100	0	0	20	45	5	12
6205	76	0	0	76	100	0	0	4	4	1	1
6206	3,028	4	0	3,024	100	0	0	144	190	37	49
6207	758	0	0	398	53	360	47	60	42	31	22
6208	3,658	15	0	3,643	100	0	0	271	190	70	59
6210	364	1	0	343	94	20	6	20	41	6	12
6212	421	0	0	261	62	160	38	46	239	22	112
6213	621	0	0	301	48	320	52	73	341	40	96
6215	154	0	0	74	48	80	52	0	35	0	19
6216	1,633	0	0	1,393	85	240	15	109	255	37	89
6217	244	0	0	204	84	40	16	44	130	15	51
6250	4,672	101	2	4,091	88	480	10	0	446	0	142
6251	139	0	0	139	100	0	0	6	17	2	4
6300	11,363	18	0	11,025	97	320	3	944	1,100	261	302
6301	14,784	106	1	14,118	95	560	4	1,118	1,104	317	313
6302	11,517	83	1	11,274	98	160	1	1,200	1,085	320	290
6303	1,138	2	0	1,096	96	40	4	63	104	18	29
6304	3,824	7	0	3,777	99	40	1	286	383	76	75
6305	5,968	17	0	5,931	100	20	0	469	500	122	113
6306	657	1	0	636	97	20	3	31	19	9	5
6307	145	0	0	145	100	0	0	26	5	7	1
6308	841	2	0	839	100	0	0	60	37	16	10
6309	3,057	7	0	2,890	95	160	5	248	124	71	36
6310	1,094	1	0	1,093	100	0	0	44	78	11	20
6311	17,395	59	0	16,696	96	640	4	2,000	369	564	104
6312	30,259	80	0	29,539	98	640	2	1,818	593	493	161
6313	5,956	12	0	3,384	57	2,560	43	892	311	443	154
6314	569	0	0	569	100	0	0	35	11	9	3
6315	669	0	0	349	52	320	48	121	106	63	56
6316	3,824	21	1	2,843	74	960	25	318	117	127	47
6317	15,569	30	0	14,899	96	640	4	622	715	175	202
6318	15,855	33	0	15,182	96	640	4	800	718	226	202

APPENDIX RM-10

DIETARY OVERLAP OF WILDLIFE AND LIVESTOCK BY PERCENT OF VEGETATIVE TYPE (continued)

	Overlap:	40%		26%		81%		Production		Overlap	
	Vegetation Type:	Riparian		Sagebrush		Timber		AUMs		AUMs	
Allotment	P. L. Acres	Acres	%	Acres	%	Acres	%	LS	WL	LS	WL
6320	1,848	15	1	1,833	99	0	0	100	139	26	36
6323	1,597	3	0	1,594	100	0	0	83	395	22	103
6324	466	1	0	465	100	0	0	14	23	4	6
6325	1,116	0	0	1,116	100	0	0	105	184	27	48
6326	1,208	2	0	1,206	100	0	0	53	115	14	30
6327	2,313	126	5	1,547	67	640	28	108	282	45	119
6328	4,503	28	0	2,555	57	1,920	43	445	179	221	89
6329	11,069	72	1	7,897	71	3,100	28	892	704	371	292
6338	1,581	5	0	786	50	790	50	120	58	64	31
6339	166	0	0	166	100	0	0	14	10	4	3
6342	3,006	3	0	2,043	68	960	32	178	135	78	59
6343	3,693	7	0	2,406	65	1,280	35	308	115	139	52
6344	2,032	21	1	1,011	50	1,000	49	172	100	91	53
6346	905	1	0	904	100	0	0	50	27	13	7
6347	1,828	5	0	1,503	82	320	18	216	28	78	10
6348	1,448	4	0	1,444	100	0	0	108	48	28	12
6349	146	27	18	119	82	0	0	10	4	3	1
6350	1,381	4	0	1,257	91	120	9	115	22	36	7
6352	119	8	7	0	0	111	93	10	0	8	0
6353	1,547	5	0	822	53	720	47	113	29	59	15
6354 (6327)											
6355	79	5	6	74	94	0	0	0	8	0	2
6356 (6329)											
6357 (6329)											
6358 (6999)											
6359	717	0	0	717	100	0	0	26	24	7	6
6360	405	0	0	405	100	0	0	23	30	3	8
6361 (6347)											
6362	1,645	0	0	545	33	1,100	67	118	29	74	18
6363	213	1	0	212	100	0	0	28	7	7	2
6364	70	0	0	70	100	0	0	17	7	4	2
6365	267	0	0	267	100	0	0	8	21	2	5
6366 (6308)											
6367	69	0	0	69	100	0	0	4	2	1	1
6368	49	8	16	41	84	0	0	0	4	0	1
6369 (6329)											
6370 (6329)											
6371 (6329)											
6372 (6328)											
6373 (6329)											
6374 (6344)											
6375 (6329)											
6400	179	0	0	179	100	0	0	8	94	2	24
6401	713	0	0	713	100	0	0	44	362	11	94
6402	45	8	18	37	82	0	0	11	21	3	6
6999	735	9	1	482	66	244	33	41	53	18	23
6500	6,551							279	922	70	231
6501	1,093							46	61	38	50
6502	10,253							868	515	746	443
6503	5,448							238	232	148	144
6504	9,953							486	130	311	83
6505	10,600							1,200	391	816	266
6506	8,173							678	342	441	222
6507	1,294							267	2	77	1

APPENDIX RM-10

DIETARY OVERLAP OF WILDLIFE AND LIVESTOCK BY PERCENT OF VEGETATIVE TYPE (continued)

	Overlap:	40%		26%		81%		Production		Overlap	
	Vegetation Type:	Riparian		Sagebrush		Timber		AUMs		AUMs	
Allotment	P. L. Acres	Acres	%	Acres	%	Acres	%	LS	WL	LS	WL
6508	2,443							65	132	40	81
6509	5,603							550	16	347	10
6510	786							216	93	138	60
8900	4,181							350	71	277	56
8901	2,325							354	66	262	49
8902	6,221							800	103	560	91
8903	3,072							202	96	176	84
8904	1,377							0	17	0	12
8905	1,738							188	9	141	7
8906	1,876							312	29	228	19
8907	3,344							264	251	185	176
8908	2,650							300	0	225	0
8909	3,100							196	118	165	100
8910	949							0	2	0	2
8911	6,100							290	70	261	63
Unallotted American-Flats	24,346							0	807	0	498
TOTAL								44,542	34,200	23,861	16,724

* Allotment includes 1,920 acres of tundra (48% of acreage) with 62% overlap.

** Allotment includes 960 acres of tundra (14% of acreage) with 62% overlap.

APPENDIX V-1

Appendix V-1

DOMINANT PLANTS AND CHARACTERISTIC PLANT ASSOCIATIONS OF THE VEGETATION TYPES IN THE EIS AREA

Common Name	Scientific Name
Sagebrush Type:	
Dominant Plant(s)	
mountain big sagebrush	Artemisia tridentata vaseyana (A. cana, A. nova, or A. rothrockii may be dominant in localized areas)
Characteristic Plant Association	
antelope bitterbrush	Purshia tridentata
bottlebrush squirreltail	Sitanion hystrix
Douglas rabbitbrush	Chrysothamnus viscidiflorus
hairy goldaster	Heterotheca villosa
Indian paintbrush	Castilleja chromosa or C. linariaefolia
larkspur	Delphinium nelsoni
low fleabane	Erigeron pumilus
needle and thread	Stipa comata
phlox	Phlox hoodii or P. longifolia
pine needlegrass	Stipa pinetorum
sky rocket gilia	Ipomopsis aggregata
snakeweed	Gutierrezia sarothae
western wheatgrass	Agropyron smithii
Mountain Shrub Type:	
Dominant Plant(s)	
Gambel oak	Quercus gambelii
Characteristic Plant Association	
American vetch	Vicia americana
arrowleaf balsamroot	Balsamorhiza sagittata
bedstraw	Galium boreale
chokecherry	Prunus virginiana
elk sedge	Carex geyeri
lambstongue groundsel	Senecio integerrimus
mountain mahoghany	Cercocarpus montanus
mulesears wyethia	Wyethia amplexicaulis
nodding brome	Bromus anomalus
serviceberry	Amelanchier alnifolia or A. utahensis
slender wheatgrass	Agropyron trachycaulum
snowberry	Symphoricarpos oreophilus
western wheatgrass	Agropyron smithii
Ponderosa Pine - Douglas Fir Type:	
Dominant Plant(s)	
Douglas fir	Pseudotsuga menziesii
ponderosa pine	Pinus ponderosa

Appendix V-1

DOMINANT PLANTS AND CHARACTERISTIC PLANT ASSOCIATIONS OF THE VEGETATION TYPES IN THE EIS AREA (continued)

Common Name	Scientific Name
Characteristic Plant Association	
Beneath ponderosa pine:	
antelope bitterbrush	*Purshia tridentata*
Arizona fescue	*Festuca arizonica*
blue grama	*Bouteloua gracilis*
fringed sage	*Artemisia frigida*
junegrass	*Koeleria cristata*
mountain mahoghany	*Cercocarpus montanus*
mountain muhly	*Muhlenbergia montana*
Parry rabbitbrush	*Chrysothamnus parryi*
Beneath Douglas fir:	
American vetch	*Vicia americana*
geranium	*Geranium fremontii* or *G. richardsonii*
junegrass	*Koeleria cristata*
mountain lover	*Pachistima myrsinites*
nodding brome	*Bromus anomalus*
sedge	*Carex* sp.
western yarrow	*Achillea lanulosa*
wheatgrass	*Agropyron smithii* or *A. trachycaulum*
Aspen Type:	
Dominant Plant(s)	
Aspen	*Populus tremuloides*
Characteristic Plant Association	
alpine timothy	*Phleum alpinum*
Barbey larkspur	*Delphinium barbeyi*
Colorado blue columbine	*Aquilegia caerulea*
fringed brome	*Bromus anomalus*
heartleaf arnica	*Arnica cordifolia*
Kentucky bluegrass	*Poa pratensis*
meadowrue	*Thalictrum* sp.

Meadow Type:

Dominant Plants(s)

The mountain meadow type has no dominant plant; it is composed of many species of grasses, sedges and forbs.

Characteristic Plant Association

Dry meadows of the lower mountains

Arizona fescue	*Festuca arizonica*
Fremont geranium	*Geranium fremontii*
harebell	*Campanula rotundifolia*

Appendix V-1

DOMINANT PLANTS AND CHARACTERISTIC PLANT ASSOCIATIONS OF THE VEGETATION TYPES IN THE EIS AREA (continued)

Common Name	Scientific Name
junegrass	Koeleria cristata
mountain muhly	Muhlenbergia montana
pine dropseed	Blepharoneuron tricholepsis
western yarrow	Achillea lanulosa
Dry meadows of subalpine areas	
alpine timothy	Phleum alpinum
cinquefoil	Potentilla sp.
Letterman needlegrass	Stipa lettermanii
orange sneezeweed	Helenium hoopesii
rough bentgrass	Agrostis scabra
spike trisetum	Trisetum spicatum
subalpine needlegrass	Stipa columbiana
fescue	Festuca thurberi or F. arizonica or F. idahoensis
Wet meadows	
bluejoint reedgrass	Calamagrostis canadensis
buttercups	Ranunculus sp.
marsh marigold	Caltha leptosepala
millet woodrush	Luzula parvifolia
rushes	Juncus sp.
sedges	Carex sp.
shrubby cinquefoil	Potentilla fruticosa
tufted hairgrass	Deschampsia caepitosa
Lodgepole Pine Type:	
Dominant Plant(s)	
Lodgepole pine	Pinus contorta
Characteristic Plant Association	
common juniper	Juniperus communis
elk sedge	Carex geyeri
mountain lover	Pachistima myrsinites
heartleaf arnica	Arnica cordifolia
russet buffaloberry	Sheperdia canadensis
Spruce-Fir Type:	
Dominant Plant(s)	
Engelmann spruce	Picea engelmnii
subalpine fir	Abies lasiocarpa
Characteristic Plant Association	
twinflower	Linnaea borealis
blueberries	Vaccinium sp.
gooseberry currant	Ribes montigenum
heartleaf arnica	Arnica cordifolia

DOMINANT PLANTS AND CHARACTERISTIC PLANT ASSOCIATIONS OF THE VEGETATION TYPES IN THE EIS AREA (continued)

Common Name	Scientific Name
Jacobs ladder	*Polemonium delicatum*
pseudomycopterus	*Pseudomycopterus montanus*
sickletop pedicularis	*Pedicularis racemosa*
wild strawberries	*Fragaria* sp.
mountain lover	*Pachistima myrsinites*

Alpine Type:

Dominant Plant(s)

The alpine type has no dominant plant; it is composed of many species of grasses, sedges and forbs.

Characteristic Plant Association

alpine avens	*Geum rossii*
alpine bluegrass	*Poa alpina*
alpine fescue	*Festuca brachyphylla*
alpine mountain sorrel	*Oxyria digyna*
alpine mouse-ear	*Cerastium beeringianum*
alpine springbeauty	*Claytonia megarrhiza*
alpine timothy	*Phleum alpinum*
American bistort	*Polygonum bistortoides*
aspen sunflower	*Helianthella quinquenervis*
Barbey larkspur	*Delphinium barbeyi*
chaenactis	*Chaenactis alpina*
Colorado blue columbine	*Aquilegia caerulea*
Engelmann spruce (Krummholz)	*Picea engelmannii*
ligularia	*Ligularia holmii*
lupine	*Lupinus parviflorus*
meadowrue	*Thalictrum* sp.
moss silene	*Silene acaulis*
Parry clover	*Trifolium parryi*
Porter ligusticum	*Ligusticum porteri*
pseudomycopterus	*Pseudomycopterus montanus*
purple pinegrass	*Calamagrostis purpurascens*
rushes	*Juncus* sp.
sedges	*Carex* sp.
sibbaldia	*Sibbaldia procumbens*
slender wheatgrass	*Agropyron trachycaulum*
spike trisetum	*Trisetum spicatum*
subalpine fir (Krummbolz)	*Abies lasiocarpa*
subalpine yarrow	*Achillea lanulosa* ssp. *alpicola*
sulfur paintbrush	*Castillejia septentrionalis*
thickleaf groundsel	*Senecio crassulus*
thistle	*Cirsium scopulorum* and *C. hesperium*
timber oatgrass	*Danthonia intermedia*
tiny hawksbeard	*Crepis nana*
tufted hairgrass	*Deschampsia caepitosa*

Riparian Type:

Dominant plant(s)

There is no region-wide dominant plant in the riparian type. In different areas and altitudes the dominants may be cottonwoods, box-elder, birch, willows, aspen, or blue spruce.

Appendix V-1

DOMINANT PLANTS AND CHARACTERISTIC PLANT ASSOCIATIONS OF THE VEGETATION TYPES IN THE EIS AREA (continued)

Common Name	Scientific Name
Characteristic Plant Association	
aspen	*Populus tremuloides*
birch	*Betula glandulosa*
bittercress	*Cardamine cordifolia*
box elder	*Acer negundo*
brook saxifrage	*Saxifraga arguta*
bulrush	*Scirpus* sp.
Colorado blue spruce	*Picea pungens*
Kentucky bluegrass	*Poa pratensis*
monkey flower	*Mimulus guttatus*
narrowleaf cottonwood	*Populus augustifolia*
red-osier dogwood	*Cornus stolonifera*
rush	*Juncus* sp.
spikerush	*Eleocharis* sp.
thinleaf alder	*Alnus tenuifolia*
willow	*Salix* sp.
willow herb	*Epilobium* sp.

Annual Weed Type:

Dominant Plant(s)

The annual weed type has no dominant plant; it consists of many different forbs, and the composition can vary considerably.

Characteristic Plant Association

amaranth	*Amaranthus retruflexus* and *Amaranthus graecizans*
belvedere summercyprus	*Kochia scoparia*
bindweed	*Convolvulus arvensis*
Canada thistle	*Cirsium arvense*
cocklebur	*Xanthium strumarium*
lambsquarters	*Chenopodium* sp.
mullein	*Verbascum thapsus*
Russian thistle	*Salsola kali*
sowthistle	*Sonchus arvensis*
tansymustard	*Descurainia* sp.
tumblemustard	*Sisymbrium* sp.

APPENDIX V-2

APPENDIX V-2

ESTIMATED FUTURE (2005) VEGETATION SITUATION COMPARED TO THE PRESENT AND POTENTIAL SITUATIONS 1/

DRY MOUNTAIN LOAM RANGE SITE

	MFP/Spring Rest Alternative 97% IM - 3% LI 2/	MFP/Fall Rest Alternative 97% IM - 3% LI	No Action Alternative 48% IM - 52% LI	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative 90% IM - 10% LI	Optimize Livestock Grazing Alternative 98% IM - 2% LI	Situation 3/ Present/Potential
IMPACTS FROM ALLOCATION AND GRAZING SYSTEMS (Rest/Season of Use, Projects) 4/							
SPECIES COMPOSITION percent (%) by weight	ARTE 37 5/ Grass 35	ARTE 34 Grass 40	ARTE 48 Grass 22	ARTE 27 Grass 55	ARTE 32 Grass 45	ARTE 54 Grass 19	ARTE 43 / 15 Grass 26 / 60
PRODUCTION pounds/acre/year	525	580	450	650	600	425	494 / 750
COVER percent (%) basal	23	22	15	30	26	14	17 / 35
CONDITION acres in each condition class							
Excellent	0	0	0	9,527 (5%)	0	0	0
Good	85,745 (45%)	97,178 (51%)	9,528 (5%)	161,963 (85%)	133,381 (70%)	0	32,808 (17%)
Fair	60,974 (32%)	49,542 (26%)	81,934 (43%)	19,055 (10%)	57,164 (30%)	91,462 (48%)	105,045 (55%)
Poor	43,826 (23%)	43,825 (23%)	99,083 (52%)	0	0	99,083 (52%)	52,692 (28%)
APPARENT TREND percent-up; down; static (%-U/0/S) of each condition class							
Excellent	NA	NA	NA	100% S	NA	NA	NA
Good	100% U	100% U	50% U/50% S	100% U	100% U	NA	95% U/5% S
Fair	60% U/40% S	70% U/30% S	60% U/40% 0	90% U/10% D	80% U/20% S	40% S/60% 0	31% U/60% S/9% 0
Poor	50% U/40% S/10% 0	60% U/40% S	20% U/40% S/40% D	80% U/20% S	70% U/30% S	40% S/60% 0	37% U/28% S/33%
IMPACTS FROM ALLOCATION, GRAZING SYSTEMS, AND VEGETATION TREATMENTS							
TREATMENT acres of treatment	55,887	55,887	0	13,927	51,827	142,548	
percent (%) type of treatment	15% spray 70% burn 15% mechanical	15% spray 70% burn 15% mechanical	NA	5% spray 80% burn 15% mechanical	5% spray 80% burn 15% mechanical	60% spray 25% burn 15% mechanical	
SPECIES COMPOSITION percent (%) by weight	ARTE 28 Grass 45	ARTE 24 Grass 50	NA	ARTE 25 Grass 58	ARTE 20 Grass 51	ARTE 19 Grass 58	Same as above
PRODUCTION pounds/acre/year	600	675	NA	660	650	700	Same as above
COVER percent (%) basal	25	27	NA	32	33	33	Same as above
CONDITION acres in each condition class							
Excellent	0	0	NA	9,527 (5%)	0	22,808 (12%)	Same as above
Good	141,632 (74%)	153,065 (80%)	NA	175,890 (97%)	185,208 (97%)	119,740 (63%)	
Fair	41,414 (22%)	29,982 (16%)	NA	5,128 (3%)	5,337 (3%)	7,200 (4%)	
Poor	7,499 (4%)	7,498 (4%)	NA	0	0	40,797 (21%)	
APPARENT TREND percent-up; down; static (%-U/0/S) of each condition class							
Excellent	NA	NA	NA	100% S	NA	80% S/20% 0	Same as above
Good	100% U	100% U	NA	100% U	100% U	70% U/30% S	
Fair	60% U/40% S	70% U/30% S	NA	90% U/10% S	80% U/20% S	40% S/60% D	
Poor	50% U/40% S/10% D	60% U/40% S	NA	80% U/20% S	NA	40% S/60% 0	

APPENDIX V-2

ESTIMATED FUTURE (2005) VEGETATION SITUATION COMPARED TO THE PRESENT AND POTENTIAL SITUATIONS 1/

MOUNTAIN OUTWASH RANGE SITE

	MFP/Spring Rest Alternative 97% IM - 3% LI 2/	MFP/Fall Rest Alternative 97% IM - 3% LI	No Action Alternative 48% IM - 52% LI	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative 90% IM - 10% LI	Optimize Livestock Grazing Alternative 98% IM - 2% LI	Situation 3/ Present/Potential
IMPACTS FROM ALLOCATION AND GRAZING SYSTEMS (Rest/Season of Use, Projects) 4/							
SPECIES COMPOSITION percent (%) by weight	ARTE 29 5/ Grass 40	ARTE 26 Grass 43	ARTE 43 Grass 25	ARTE 18 Grass 54	ARTE 21 Grass 50	ARTE 54 Grass 21	ARTE 35 / 3 Grass 33 / 71
PRODUCTION pounds/acre/year	550	600	380	675	640	360	424 / 800
COVER percent (%) basal	21	22	19	25	23	18	20 / 25
CONDITION acres in each condition class							
Excellent	0	0	0	1,269 (10%)	0	0	0
Good	2,358 (20%)	3,172 (25%)	0	8,883 (70%)	6,345 (50%)	0	59 (1%)
Fair	5,076 (40%)	4,442 (35%)	0	2,538 (20%)	6,345 (50%)	0	1,148 (9%)
Poor	5,076 (40%)	5,076 (40%)	12,690 (10%)	0	0	12,690 (10%)	11,483 (90%)
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA	NA	NA	100% S	NA	NA	NA
Good	40% U/60% S	45% U/55% S	NA	70% U/30% S	60% U/40% S	NA	100% S
Fair	90% U/10% S	95% U/5% S	NA	100% U	100% U	NA	76% U/24% S
Poor	55% U/50% S	55% U/5% S	30% S/70% D	NA	NA	25% S/75% D	14% U/35% S/51% D
IMPACTS FROM ALLOCATION, GRAZING SYSTEMS, AND VEGETATION TREATMENTS							
TREATMENT acres of treatment	2,150	2,150	0	7,192	10,136	1,297	
percent (%) type of treatment	15% spray 70% burn 15% mechanical	15% spray 70% burn 15% mechanical	NA NA NA	5% spray 80% burn 15% mechanical	5% spray 80% burn 15% mechanical	60% spray 25% burn 15% mechanical	
SPECIES COMPOSITION percent (%) by weight	ARTE 25 Grass 45	ARTE 23 Grass 49	NA NA	ARTE 9 Grass 68	ARTE 9 Grass 66	ARTE 42 Grass 28	Same as above
PRODUCTION pounds/acre/year	590	675	NA	760	750	400	Same as above
COVER percent (%) basal	21	22	NA	25	25	20	Same as above
CONDITION acres in each condition class							
Excellent	0	0	NA	5,923 (47%)	3,791 (30%)	0	Same as above
Good	4,688 (37%)	5,322 (42%)	NA	6,767 (53%)	8,899 (70%)	1,297 (10%)	Same as above
Fair	5,076 (40%)	4,442 (35%)	NA	0	0	11,393 (9%)	Same as above
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA	NA	NA	100% U	90% S/10% D	NA	Same as above
Good	50% U/50% S	60% U/40% S	NA	85% U/15% S	70% U/30% S	25% S/75% D	Same as above
Fair	90% U/10% S	95% U/5% S	NA	NA	NA	NA	Same as above
Poor	50% U/50% S	55% U/45% S	NA	NA	NA	25% S/75% D	Same as above

APPENDIX V-2

ESTIMATED FUTURE (2005) VEGETATION SITUATION COMPARED TO THE PRESENT AND POTENTIAL SITUATIONS 1/

SUBALPINE LOAM RANGE SITE - GUNNISON BASIN

	MFP/Spring Rest Alternative 97% IM - 3% LI 2/	MFP/Fall Rest Alternative 97% IM - 3% LI	No Action Alternative 48% IM - 52% LI	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative 90% IM - 10% LI	Optimize Livestock Grazing Alternative 98% IM - 2% LI	Situation 3/ Present/Potential
IMPACTS FROM ALLOCATION AND GRAZING SYSTEMS (Rest/Season of Use, Projects) 4/							
SPECIES COMPOSITION percent (%) by weight	ARTE 27 5/ Grass 45	ARTE 25 Grass 49	ARTE 39 Grass 30	ARTE 18 Grass 60	ARTE 22 Grass 54	ARTE 46 Grass 24	ARTE 32 / 4 Grass 39 / 73
PRODUCTION pounds/acre/year	900	1,000	650	1,200	1,100	625	695 / 2,750
COVER percent (%) basal	26	28	20	35	32	19	23 / 50
CONDITION acres in each condition class							
Excellent	0	0	0	6,310 (20%)	1,577 (5%)	0	0
Good	8,203 (26%)	9,465 (30%)	0	18,929 (60%)	17,352 (55%)	0	35 (1%)
Fair	4,732 (15%)	3,470 (11%)	1,577 (5%)	6,310 (20%)	12,620 (40%)	0	7,335 (23%)
Poor	18,614 (59%)	18,614 (59%)	29,972 (95%)	0	0	31,549 (100%)	24,179 (76%)
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA	NA	NA	100% S	100% S	NA	NA
Good	60% U/40% S	65% U/35% S	NA	90% U/10% S	80% U/20% S	NA	32% U/68% S
Fair	70% U/30% S	75% U/25% S	30% U/50% S/20% D	100% U	90% U/10% S	NA	47% U/51% S/2% D
Poor	70% U/30% S	75% U/25% S	25% U/40% S/35% D	NA	NA	10% U/40% S/50% D	52% U/34% S/14% D
IMPACTS FROM ALLOCATION, GRAZING SYSTEMS, AND VEGETATION TREATMENTS 6/							
TREATMENT acres of treatment	11,365	11,365	0	7,797	21,835	14,901	
percent (%) type of treatment	15% spray 70% burn 15% mechanical	15% spray 70% burn 15% mechanical	NA	5% spray 80% burn 15% mechanical	5% spray 80% burn 15% mechanical	60% spray 25% burn 15% mechanical	
SPECIES COMPOSITION percent (%) by weight	ARTE 20 Grass 56	ARTE 17 Grass 60	NA	ARTE 14 Grass 68	ARTE 8 Grass 69	ARTE 25 Grass 46	Same as above
PRODUCTION pounds/acre/year	1,200	1,300	NA	1,500	1,600	1,100	Same as above
COVER percent (%) basal	31	33	NA	37	40	29	Same as above
CONDITION acres in each condition class							
Excellent	0	0	NA	7,797 (25%)	10,792 (34%)	0	Same as above
Good	19,568 (62%)	20,830 (66%)	NA	23,752 (75%)	20,757 (66%)	14,901 (47%)	Same as above
Fair	3,141 (10%)	1,879 (6%)	NA	0	0	0	Same as above
Poor	8,840 (28%)	8,840 (28%)	NA	0	0	16,648 (53%)	Same as above
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA		NA	100% S	100% S	NA	Same as above
Good	80% U/20% S	85% U/15% S	NA	100% U	90% U/10% S	70% S/30% D	Same as above
Fair	70% U/30% S	75% U/25% S	NA	NA	NA	NA	Same as above
Poor	70% U/30% S	75% U/25% S	NA	NA	NA	10% /40% S/50% D	Same as above

APPENDIX V-2

ESTIMATED FUTURE (2005) VEGETATION SITUATION COMPARED TO THE PRESENT AND POTENTIAL SITUATIONS 1/

MOUNTAIN LOAM RANGE SITE

	MFP/Spring Rest Alternative 97% IM - 3% LI 2/	MFP/Fall Rest Alternative 97% IM - 3% LI	No Action Alternative 48% IM - 52% LI	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative 90% IM - 10% LI	Optimize Livestock Grazing Alternative 98% IM - 2% LI	Situation 3/ Present/Potential
IMPACTS FROM ALLOCATION AND GRAZING SYSTEMS (Rest/Season of Use, Projects) 4/							
SPECIES COMPOSITION percent (%) by weight	ARTE 28 5/ Grass 42	ARTE 25 Grass 47	ARTE 40 Grass 26	ARTE 17 Grass 59	ARTE 21 Grass 51	ARTE 45 Grass 20	ARTE 33/ 10 Grass 35/ 73
PRODUCTION pounds/acre/year	750	850	500	1,200	1,100	450	582/ 1,500
COVER percent (%) basal	25	27	19	31	30	18	21/ 35
CONDITION acres in each condition class							
Excellent	0	0	0	7,728 (20%)	1,932 (5%)	0	0
Good	11,592 (30%)	13,524 (35%)	0	30,912 (80%)	27,048 (70%)	0	3,913 (10%)
Fair	13,138 (34%)	11,206 (29%)	17,388 (45%)	0	9,660 (25%)	15,456 (40%)	20,001 (52%)
Poor	13,910 (36%)	13,910 (36%)	21,252 (55%)	0	0	23,184 (60%)	14,726 (38%)
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA	NA	NA	100% S	100% S	NA	NA
Good	100% U	100% U	NA	100% U	100% U	NA	100% U
Fair	60% U/40% S	65% U/35% S	50% S/50% D	NA	80% U/20% S	40% S/60% D	31% U/68% S/1% D
Poor	75% U/25% S	80% U/20% S	40% U/40% S/20% D	NA	NA	30% U/40% S/30% D	63% U/36% S/1% D
IMPACTS FROM ALLOCATION, GRAZING SYSTEMS, AND VEGETATION TREATMENTS							
TREATMENT acres of treatment	19,830	19,830	0	5,908	14,192	24,216	
percent (%) type of treatment	15% spray 70% burn 15% mechanical	15% spray 70% burn 15% mechanical	NA NA NA	5% spray 80% burn 15% mechanical	5% spray 80% burn 15% mechanical	60% spray 25% burn 15% mechanical	
SPECIES COMPOSITION percent (%) by weight	ARTE 18 Grass 60	ARTE 15 Grass 64	NA NA	ARTE 15 Grass 62	ARTE 16 Grass 64	ARTE 22 Grass 53	Same as above " " "
PRODUCTION pounds/acre/year	1,000	1,200	NA	1,250	1,350	1,000	" " "
COVER percent (%) basal	29	31	NA	32	33	29	" " "
CONDITION acres in each condition class							
Excellent	0	0	NA	13,626 (35%)	6,464 (17%)	3,913 (10%)	" " "
Good	31,422 (81%)	33,354 (86%)	NA	25,004 (65%)	32,176 (83%)	20,304 (53%)	" " "
Fair	3,421 (9%)	1,489 (4%)	NA	0	0	2,863 (7%)	" " "
Poor	3,797 (10%)	3,797 (10%)	NA	0	0	11,560 (30%)	" " "
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA	NA	NA	100% S	100% S	60% S/40% D	" " "
Good	100% U	100% U	NA	100% U	100% U	50% U/75% S	" " "
Fair	60% U/40% S	65% U/35% S	NA	NA	NA	40% S/60% D	" " "
Poor	75% U/25% S	80% U/20% S	NA	NA	NA	30% U/40% S/30% D	" " "

APPENDIX V-2

ESTIMATED FUTURE (2005) VEGETATION SITUATION COMPARED TO THE PRESENT AND POTENTIAL SITUATIONS 1/

MOUNTAIN SWALE RANGE SITE

	MFP/Spring Rest Alternative 97% IM - 3% LI 2/	MFP/Fall Rest Alternative 97% IM - 3% LI	No Action Alternative 48% IM - 52% LI	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative 90% IM - 10% LI	Optimize Livestock Grazing Alternative 98% IM - 2% LI	Situation 3/	
							Present	Potential
IMPACTS FROM ALLOCATION AND GRAZING SYSTEMS (Rest/Season of Use, Projects) 4/								
SPECIES COMPOSITION percent (%) by weight	ARTE 35 5/ Grass 43	ARTE 14 Grass 47	ARTE 47 Grass 24	ARTE 24 Grass 57	ARTE 28 Grass 49	ARTE 55 Grass 19	ARTE 42/ Grass 30	2 78
PRODUCTION pounds/acre/year	1,000	1,175	500	1,800	1,600	475	589	2,750
COVER percent (%) basal	32	34	21	42	39	20	25	50
CONDITION acres in each condition class								
Excellent	0	0	0	542 (10%)	0	0	0	
Good	542 (10%)	813 (15%)	0	3,253 (60%)	3,795 (70%)	0	0	
Fair	2,711 (50%)	3,253 (60%)	0	1,626 (30%)	1,626 (30%)	0	424 (8%)	
Poor	2,168 (4%)	1,355 (25%)	5,431 (100%)	0	0	5,421 (100%)	4,997 (92%)	
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class								
Excellent	NA	NA	NA	100% S	NA	NA	NA	
Good	80% U/20% S	85% U/15% S	NA	100% U	95% U/5% S	NA	NA	
Fair	60% U/40% S	65% U/35% S	NA	90% U/10% S	80% U/20% S	NA	100% S	
Poor	30% U/70% S	35% U/65% S	20% S/80% 0	NA	NA	15% S/85% D	4% U/36% S/60% D	
IMPACTS FROM ALLOCATION, GRAZING SYSTEMS, AND VEGETATION TREATMENTS								
TREATMENT acres of treatment	3,608	3,608	0	0	1,574	4,323		
percent (%) type of treatment	15% spray 70% burn 15% mechanical	15% spray 70% burn 15% mechanical	NA NA NA	5% spray 80% burn 15% mechanical	5% spray 80% burn 15% mechanical	60% spray 25% burn 15% mechanical		
SPECIES COMPOSITION percent (%) by weight	ARTE 18 Grass 62	ARTE 16 Grass 67	NA NA	NA NA	ARTE 23 Grass 58	ARTE 23 Grass 52	Same as above " " "	
PRODUCTION pounds/acre/year	2,000	2,150	NA	NA	1,800	1,600	" " "	
COVER percent (%) basal	40	42	NA	NA	43	39	" " "	
CONDITION acres in each condition class								
Excellent	0	0	NA	NA	0	0	" " "	
Good	4,150 (77%)	4,421 (82%)	NA	NA	5,369 (99%)	4,323 (80%)	" " "	
Fair	1,271 (23%)	1,000 (18%)	NA	NA	52 (1%)	0	" " "	
Poor	0	0	NA	NA	0	1,098 (20%)	" " "	
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class								
Excellent	NA	NA	NA	NA	NA	NA	" " "	
Good	85% U/5% S	90% U/10% S	NA	NA	100% U	60% S/40% 0	" " "	
Fair	60% U/40% S	65% U/35% S	NA	NA	80% U/20% S	NA	" " "	
Poor	30% U/70% S	35% U/65% S	NA	NA	NA	15% S/85% D	" " "	

APPENDIX V-2

ESTIMATED FUTURE (2005) VEGETATION SITUATION COMPARED TO THE PRESENT AND POTENTIAL SITUATIONS 1/

PINE GRASSLAND RANGE SITE

	MFP/Spring Rest Alternative 97% IM - 3% LI 2/	MFP/Fall Rest Alternative 97% IM - 3% LI	No Action Alternative 48% IM - 52% LI	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative 90% IM - 10% LI	Optimize Livestock Grazing Alternative 98% IM - 2% LI	Situation 3/ Present/Potential
IMPACTS FROM ALLOCATION AND GRAZING SYSTEMS (Rest/Season of Use, Projects) 4/							
SPECIES COMPOSITION percent (%) by weight	ARTE 26 5/ Grass 37	ARTE 24 Grass 39	ARTE 36 Grass 24	ARTE 19 Grass 45	ARTE 22 Grass 42	ARTE 45 Grass 19	ARTE 31/ 10 Grass 32/ 50
PRODUCTION pounds/acre/year	480	550	350	700	650	330	396 850
COVER percent (%) basal	21	24	14	31	29	13	15 35
CONDITION acres in each condition class							
Excellent	0	0	0	8,214 (40%)	2,053 (10%)	0	0
Good	9,857 (48%)	11,294 (55%)	1,027 (5%)	12,321 (60%)	14,375 (70%)	0	6,236 (30%)
Fair	4,107 (20%)	3,080 (15%)	8,214 (40%)	0	4,107 (20%)	8,214 (40%)	6,309 (31%)
Poor	6,572 (32%)	6,161 (30%)	11,294 (55%)	0	0	12,321 (60%)	7,990 (39%)
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA	NA	NA	100% S	100% S	NA	NA
Good	100% U	100% U	50% U/50% S	100% U	100% U	NA	84% U/16% S
Fair	60% U/40% S	65% U/35% S	10% U/40% S/50% D	NA	80% U/20% S	40% S/60% D	23% U/50% S/18% D
Poor	70% U/30% S	75% U/25% S	25% U/50% S/30% D	NA	NA	5% U/50% S/45% D	32% U/61% S/7% D
IMPACTS FROM ALLOCATION, GRAZING SYSTEMS, AND VEGETATION TREATMENTS							
TREATMENT acres of treatment	3,138	3,138	0	0	7,556	12,977	
percent (%) type of treatment	15% spray 70% burn 15% mechanical	15% spray 70% burn 15% mechanical	NA NA NA	5% spray 80% burn 15% mechanical	5% spray 80% burn 15% mechanical	60% spray 25% burn 15% mechanical	
SPECIES COMPOSITION percent (%) by weight	ARTE 24 Grass 40	ARTE 21 Grass 46	NA NA	NA NA	ARTE 18 Grass 48	ARTE 24 Grass 48	Same as above Same as above
PRODUCTION pounds/acre/year	530	590	NA	NA	725	675	Same as above
COVER percent (%) basal	23	26	NA	NA	32	28	Same as above
CONDITION acres in each condition class							
Excellent	439 (2%)	439 (2%)	NA	NA	5,502 (27%)	5,069 (25%)	Same as above
Good	12,117 (60%)	13,554 (67%)	NA	NA	15,033 (73%)	2,989 (15%)	Same as above
Fair	2,538 (12%)	1,511 (7%)	NA	NA	0	5,095 (25%)	Same as above
Poor	5,441 (26%)	5,031 (24%)	NA	NA	0	7,382 (36%)	Same as above
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	80% S/20% D	85% S/20% D	NA	NA	100% S	60 S/40% D	Same as above
Good	100% U	100% U	NA	NA	100% U	55% U/45% S	Same as above
Fair	60% U/40% S	65% U/35% S	NA	NA	NA	40% S/60% D	Same as above
Poor	70% U/30% S	75% U/25% S	NA	NA	NA	5% U/50% S/45% D	Same as above

APPENDIX V-2

ESTIMATED FUTURE (2005) VEGETATION SITUATION COMPARED TO THE PRESENT AND POTENTIAL SITUATIONS [1]

SHALLOW SUBALPINE RANGE SITE

	MFP/Spring Rest Alternative	MFP/Fall Rest Alternative	No Action Alternative	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative	Optimize Livestock Grazing Alternative	Situation [3]	
	97% IM - 3% LI [2]	97% IM - 3% LI	48% IM - 52% LI		90% IM - 10% LI	98% IM - 2% LI	Present/	Potential
IMPACTS FROM ALLOCATION AND GRAZING SYSTEMS (Rest/Season of Use, Projects) [4]								
SPECIES COMPOSITION percent (%) by weight	ARTE 15 [5] Grass 58	ARTE 14 Grass 62	ARTE 23 Grass 30	ARTE 10 Grass 70	ARTE 12 Grass 63	ARTE 33 Grass 23	ARTE 20/ Grass 38/	10 75
PRODUCTION pounds/acre/year	600	725	425	1,200	1,000	400	475	1.640
COVER percent (%) basal	15	21	10	35	28	10	10	45
CONDITION acres in each condition class								
Excellent	0	0	0	2,117 (30%)	353 (5%)	0	0	
Good	1,411 (20%)	1,763 (25%)	0	3,528 (50%)	4,233 (60%)	0	0	
Fair	2,469 (35%)	2,117 (30%)	2,117 (30%)	1,410 (20%)	2,469 (35%)	1,764 (25%)	3,462 (49%)	
Poor	3,175 (45%)	3,175 (45%)	4,938 (70%)	0	0	5,291 (75%)	3,593 (51%)	
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class								
Excellent	NA	NA	NA	100% S	100% S	NA	NA	
Good	70% U/30% S	75% U/35% S	NA	90% U/10% S	85% U/15% S	NA	NA	
Fair	40% U/16% S	50% U/50% S	50% S/50% D	80% U/20% S	70% U/30% S	40% S/60% D	71% S/29% D	
Poor	50% U/50% S	60% U/40% S	20% S/80% E	NA	NA	10% S/90% D	25% U/5% S/70% D	
IMPACTS FROM ALLOCATION, GRAZING SYSTEMS, AND VEGETATION TREATMENTS								
TREATMENT acres of treatment	0	0	0	0	3,267	1,081		
percent (%) type of treatment	15% spray 70% burn 15% mechanical	15% spray 70% burn 15% mechanical	NA NA NA	5% spray 80% burn 15% mechanical	5% spray 80% burn 15% mechanical	60% spray 25% burn 15% mechanical		
SPECIES COMPOSITION percent (%) by weight	NA NA	NA NA	NA NA	NA NA	ARTE 10 Grass 70	ARTE 21 Grass 34	Same as above "	
PRODUCTION pounds/acre/year	NA	NA	NA	NA	1,450	550	"	
COVER percent (%) basal	NA	NA	NA	NA	38	14	"	
CONDITION acres in each condition class								
Excellent	NA	NA	NA	NA	1,151 (16%)	0	"	
Good	NA	NA	NA	NA	5,904 (84%)	1,081 (15%)	"	
Fair	NA	NA	NA	NA	0	1,764 (25%)	"	
Poor	NA	NA	NA	NA	0	4,210 (60%)	"	
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class								
Excellent	NA	NA	NA	NA	100 S	NA		
Good	NA	NA	NA	NA	90% U/10% S	60% U/40% S	"	
Fair	NA	NA	NA	NA	NA	40% U/60% D	"	
Poor	NA	NA	NA	NA	NA	10% S/90% D	"	

APPENDIX V-2

ESTIMATED FUTURE (2005) VEGETATION SITUATION COMPARED TO THE PRESENT AND POTENTIAL SITUATIONS [1]

MOUNTAIN MEADOW RANGE SITE

	MFP/Spring Rest Alternative 97% IM - 3% LI [2]	Fall Rest Alternative 97% IM - 3% LI	No Action Alternative 48% IM - 52% LI	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative 90% IM - 10% LI	Optimize Livestock Grazing Alternative 98% IM - 2% LI	Situation [3] Present/Potential
IMPACTS FROM ALLOCATION AND GRAZING SYSTEMS (Rest/Season of Use, Projects) [4]							
SPECIES COMPOSITION percent (%) by weight	Forbs 27 [5] Grass 63	Forbs 24 Grass 67	Forbs 39 Grass 35	Forbs 18 Grass 78	Forbs 21 Grass 73	Forbs 41 Grass 32	Forbs 31 / 18 Grass 51 / 78
PRODUCTION pounds/acre/year	1,600	1,700	1,400	2,400	1,800	1,350	1,495 / 3,000
COVER percent (%) basal	58	60	50	66	63	48	50 / 70
CONDITION acres in each condition class							
Excellent	0	0	0	1,469 (40%)	367 (10%)	0	0
Good	1,138 (31%)	1,322 (36%)	0	2,203 (60%)	3,305 (90%)	0	398 (11%)
Fair	1,432 (39%)	1,579 (43%)	1,652 (45%)	0	0	1,469 (40%)	1,021 (55%)
Poor	1,102 (3%)	771 (21%)	2,020 (55%)	0	0	2,203 (60%)	1,253 (34%)
APPARENT TREND percent-up; down; static (%-U/0/S) of each condition class							
Excellent	NA	NA	NA	100% S	100% S	NA	NA
Good	60% U/40% S	65% U/35% S	NA	100% U	95% U/5% S	NA	100% S
Fair	50% U/50% S	55% U/45% S	60% S/40% 0	NA	NA	50% S/50% 0	9% U/86% S/5% D
Poor	35% U/65% S	40% U/60% S	30% S/70% 0	NA	NA	25% S/75% 0	11% U/42% S/47% 0
IMPACTS FROM ALLOCATION, GRAZING SYSTEMS, AND VEGETATION TREATMENTS							
TREATMENT acres of treatment	1,002	1,002	0	0	814	404	
percent (%) type of treatment	15% spray 70% burn 15% mechanical	15% spray 70% burn 15% mechanical	NA NA NA	5% spray 80% burn 15% mechanical	5% spray 80% burn 15% mechanical	60% spray 25% burn 15% mechanical	
SPECIES COMPOSITION percent (%) by weight	Forbs 22 Grass 71	Forbs 19 Grass 74	NA NA	NA NA	Forbs 19 Grass 74	Forbs 38 Grass 34	Same as above " " "
PRODUCTION pounds/acre/year	2,100	2,200	1,400	2,300	2,300	1,525	Same as above
COVER percent (%) basal	60	61	NA	NA	65	50	Same as above
CONDITION acres in each condition class							
Excellent	0	0	NA	NA	1,181 (32%)	0	Same as above
Good	2,140 (58%)	2,324 (63%)	NA	NA	2,491 (68%)	404 (11%)	" " "
Fair	1,432 (39%)	1,348 (37%)	NA	NA	0	1,469 (40%)	" " "
Poor	100 (3%)	0	NA	NA	0	1,799 (49%)	" " "
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA	NA	NA	NA	100% S	NA	Same as above
Good	70% U/30% S	75% U/25% S	NA	NA	95% U/5% S	60% S/40% 0	" " "
Fair	50% U/50% S	55% U/43% S	NA	NA	NA	50% S/50% D	" " "
Poor	35% U/65% S	40% U/60% S	NA	NA	NA	25% S/75% 0	" " "

APPENDIX V-2

ESTIMATED FUTURE (2005) VEGETATION SITUATION COMPARED TO THE PRESENT AND POTENTIAL SITUATIONS [1]

SUBALPINE LOAM RANGE SITE - AMERICAN FLATS/SILVERTON

	MFP/Spring Rest Alternative [2] 97% IM - 3% LI	Fall Rest Alternative 97% IM - 3% LI	No Action Alternative 48% IM - 52% LI	Elimination of Livestock Grazing Alternative	Optimize Wildlife and Watershed Values Alternative 90% IM - 10% LI	Optimize Livestock Grazing Alternative 98% IM - 2% LI	Situation [3] Present/Potential
IMPACTS FROM ALLOCATION AND GRAZING SYSTEMS (Rest/Season of Use, Projects) [4]							
SPECIES COMPOSITION percent (%) by weight	Forbs 30 [5] Grass 55	Forbs 28 Grass 60	Forbs 58 Grass 30	Forbs 20 Grass 70	Forbs 25 Grass 65	Forbs 60 Grass 28	Forbs 50 / 17 Grass 40 / 73
PRODUCTION pounds/acre/year	1,100	1,100	700	1,900	1,300	650	731 / 2,750
COVER percent (%) basal	30	33	16	45	40	15	18 / 50
CONDITION acres in each condition class							
Excellent	0	0	0	1,343 (20%)	336 (5%)	0	0
Good	2,014 (30%)	2,686 (40%)	0	5,373 (80%)	4,701 (70%)	0	61 (1%)
Fair	2,351 (35%)	1,679 (25%)	2,686 (40%)	0	1,679 (25%)	2,351 (35%)	3,993 (59%)
Poor	2,351 (35%)	2,351 (35%)	4,030 (60%)	0	0	4,365 (65%)	2,662 (40%)
APPARENT TREND percent-up; down; static (%-U/D/S) of each condition class							
Excellent	NA	NA	NA	100% S	100% S	NA	NA
Good	70% U/30% S	75% U/25% S	NA	100% U	90% U/10% S	NA	43% U/57% S
Fair	65% U/35% S	70% U/30% S	40% S/60% D	90% U/10% S	85% U/15% S	30% S/70% D	55% U/43% S/2% D
Poor	85% U/15% S	90% U/10% S	50% S/50% D	100% U	95% U/5% S	40% S/60% D	60% U/40% S

APPENDIX V-2

FOOTNOTES

[1] The figures shown represent the estimated range of response of the vegetation to the alternatives. Methodology used in determining the figures is in Appendix V-3

[2] IM = Intensive management; LI = Less intensive management.

[3] Potential ecological condition is all acres in an excellent category (not shown); potential apparent trend is all acres with an upward trend (not shown). The figures in the existing situation represent an average of all the 1978 range surveys within each range site. Unsuitable acres for livestock grazing (densely wooded areas or steep slopes) were not sampled and are not included in the tables.

[4] For the MFP/Spring Rest, Optimize Wildlife and Watershed Values, and Optimize Livestock Grazing alternatives, allocation is responsible for a larger proportion of the impacts shown (approximately 30 percent for vegetation condition) due to the more effective season of rest (see discussion on page ______). The difference between the impacts shown in the MFP/Spring Rest and MFP/Fall Rest alternatives is due only to the modified rest schedule. The impacts shown for the Elimination of Livestock Grazing Alternative are due entirely to allocation.

[5] ARTE -- usually *Artemisia tridentata vaseyana*; but may be *Artemisia nova*, *A. cana*, or *A. rothrockii*.

Grass -- usually grass species, but also may include grass-like plants (sedges, rushes) for the mountain meadow range site.

[6] The Gunnison Basin (sagebrush-dominated) portion of the Subalpine Loam range site is considered separately from the American Flats/Silverton portion of the range site. No vegetation treatments would be done in the American Flats/Silverton portion.

APPENDIX V-3

APPENDIX V-3

METHODOLOGY FOR THE VEGETATION IMPACT TABLES

The quantified vegetation impacts shown in Appendix V-2 by range site and summarized in table 4-1 are estimates of the anticipated vegetation impacts. The tables were constructed around several premises, which will be discussed in this section. Support for the premises is based on professional knowledge of the vegetation characteristics of the EIS area, and cited literature studies.

Premise #1: Allocation levels are of greater importance than grazing systems in determining vegetation response.

The vegetation impacts are analyzed in two ways for each range site in Appendix V-2. One is the vegetation response from the proposed allocation levels and grazing systems in the alternatives, and the second is the additive vegetation response from allocation grazing systems and vegetation treatments.

In the allocation and grazing systems section for all the alternatives except Fall Rest, allocation is responsible for the majority of the vegetation response (approximately 90 percent), while grazing systems (rest/season of use and range improvements) are responsible for the remaining 10 percent.

That allocation is more important than grazing systems in determining vegetation response is supported by the literature. Van Poollen and Lacey (1979) in a review of pertinent literature found that annual herbage production increased 27 percent (plus or minus 13 percent) and 35 percent (plus or minus 14 percent) when grazing intensity was reduced from heavy to moderate, and moderate to light, respectively. Implementation of grazing systems resulted in 13 percent (plus or minus 8 percent) increase in production. Thus, if livestock is reduced from heavy to moderate simultaneously when a grazing system is implemented, the reduced allocation would be expected to account for 73 percent of the herbage response, with grazing systems responsible for 27 percent of the response. This situation can be correlated to the allocation modifications and proposed grazing systems in the alternatives.

Frischknecht (1978) in a study of the effects of grazing, environmental factors, and disturbances on the long term productivity of sagebrush-grass ranges found that intensity of grazing exerted greater influence on vegetal changes than systems of grazing. Martin (1978) in a paper on grazing systems reiterated the importance of proper stocking rates in relation to grazing systems. He stated that "no grazing system can succeed if the range is overstocked."

Grazing systems are of more importance in determining the vegetation response for the Fall Rest Alternative than the other alternatives, mainly due to the more effective period of rest. (Grazing systems are responsible for 30 percent of the vegetation condition response, allocation is the causal agent for the remaining 70 percent.) Under all the alternatives except Fall Rest, the rest schedule described in MFP/Spring Rest would be adopted in new allotment management plans. However, problems exist in the spring rest schedule (discussed in Chapter 4 for MFP/Spring Rest) which nullify a similar magnitude of vegetation response as is expected under the Fall Rest. The problems are associated with the premise that late summer or early fall rest is of more importance than spring rest, which is mentioned in the next section.

Premise #2: Moderate spring use and late summer or early fall rest is more beneficial to grass plants than spring rest and moderate late summer or early fall use.

Spring grazing and summer or early fall rest allows time for regrowth and accumulation of carbohydrate reserves before fall dormancy. Adequate precipitation (which is the most important factor influencing forage production--Stoddart, 1975, p. 9) is normally available for grass regrowth during summer months in the Gunnison Basin. As shown on Table 3-2, July and August are the months of highest average precipitation at most weather stations in the Gunnison Basin.

Spring rest and late summer and fall use conversely is harmful to the continued vigor of grass plants, because they are defoliated at a time when growth is slow and the plants are actively restoring their carbohydrate reserves. Defoliation reduces the amount of leaf area able to undergo photosynthesis and thus severely reduces the plants capacity to store reserves.

The difference between spring and fall rest is further discussed in Chapter 2 and in Appendix RM-9. Literature support for the above statements are also included.

Premise #3: Sagebrush severely competes with perennial grass plants. As sagebrush increases in density and vigor, grass will decrease.

On all the impact tables, where sage shows a decrease in composition, grass shows a corresponding decrease. Also, as the sagebrush composition increases, the condition of the vegetation decreases, since in the potential plant community only 2-15 percent species composition of sagebrush exists. Several literature sources support these statements, and are summarized below.

Robertson (1947) found that mature sagebrush plants dominated the area within a radius of roughly one meter, and as the stands are reduced to wider spacing, release from competition will make conditions progressively better for growth of grasses. Blaisdell (1949) showed that young sagebrush seedling stands may allow establishment of satisfactory grass stands, but they suppress the grass and cause a great reduction in yeild. Older (dense) stands of sagebrush may suppress grass establishment. Cooper (1953) stated that relative amounts of sagebrush in excess of 10 percent of total coverage in plant communities near Tensleep, Wyoming represented ecological degeneration. He found that with proper grazing levels and periodic rest combined with favorable weather conditions (normal precipitation patterns) perennial grass plants can successfully compete with sagebrush and displace it in the plant community. Frischknecht (1978) found that as sagebrush crown diameters increased (past 45 cm), yields per unit area of crested wheatgrass decreased.

Premise #4: Vegetation treatmens significantly increase production, cover, condition, and trend of sagebrush-dominated range sites.

The vegetation response shown by range site from the allocation and grazing systems would be improved (would go closer to the potential) by vegetation treatments. The magnitude of improvement would be correlated to the amount of treatments that are proposed for the range site. The vegetation response shown by 2005 is dependent on the assumption that where necessary retreatment would be done to control invading sagebrush. Retreatment costs are built into the annual maintenance revenue for range improvements.

Numerous researchers have shown increases in production, cover, and species composition of grasses as a result of vegetation treatments. Where perennial grass composition is low, reseeding is necessary to obtain positive results following treatments. Below are several literature references which indicate that production, cover, composition, etc. will be increased by vegetation treatment: Shown et al. (1969); Wright (1974); Eckert et al. (1972); Bleak and Miller (1955); Ralphs and Busby (1979); Sneva (1972); Rauzi (1975); Hedrick et al. (1966); Alley (1965); Hull et al. (1951); Cornelrus and Graham (1958); Hull, Kissinger, and Vaughn (1952).

Premise #5: Big game use generally has less influence on the vegetation response (vegetation composition, production, cover, and condition) on range sites than livestock use does in the EIS area.

In the Gunnison Basin, 86 percent of the public land covered by range sites (306,435 acres) is dominated by sagebrush and is big game winter range. The majority of the big game are at higher elevations during the summer growing season months. As such, because of their habits, the animals do not use much of the herbaceous vegetation production available on the sagebrush-dominated range sites during the summer. When they come onto the range sites in winter, most of the herbaceous production is dormant, and covered by snow. At this time the big game utilize largely browse plants, such as sagebrush and bitterbrush.

Big game utilize more browse and forbs in timbered areas than cattle do, and concentrate less in favorable sites, such as meadows, than cattle do during the summer growing season (Nagle and Harris 1966; Mackie 1970; Jones 1965). Consequently in the high elevation summer ranges, big game are expected to use less of the vegetation production available on range sites than livestock will.

Premise #6: Areas with a high composition of perennial grasses generally have more total production per unit area than areas with a high composition of sagebrush, other factors being equal.

Support for the above statement is found in the following literature: Cooper (1953); Hedrick et al. (1966); Rauzi (1975); Sneva et al. (1972); Eckert et al. (1972).

The reason for the higher production per unit area of grasses is probably because grasses occupy more basal area and are less efficient utilizers of moisture than sagebrush (Alley 1965).

APPENDIX V-4

APPENDIX V-4

ACRES OF RANGE SITES IN EACH ALLOTMENT IN THE EIS AREA

Allotment	Dry Mountain Loam	Mountain Loam	Mountain Outwash	Mountain Swale	Mountain Meadow	Pine Grassland	Shallow Subalpine	Subalpine Loam	Alpine Slopes	Unclassified 1/
5209	579									63
6000	33									
6001		2,901								40
6003		143								396
6004		153								179
6005										580
6006								56		422
6007								126		336
6008								28		513
6009										37
6010	572							923		830
6011	341	448			40			231		15
6013										302
6014								20		
6015	34					18				21
6016								414		193
6017	19									27
6018					59			96		3,221
6019										198
6021										268
6022	13				22					
6024					1					638
6026		82								16
6027								71		154
6029								24		141
6030								35		65
6031								202		2,342
6032								372		1,367
6033					22			527		2,879
6034	264	321		18						489
6036		40								
6037								183		308
6040								62		264
6050					10			250		232
6051							4	80		548
6052								80		1,456
6053								210		728
6054					33			64		848
6055	1,640			36				211		187
6056	817	496								1,199
6100	30	6,518		115	38	2,176				6,452
6101	29	7,831								241

APPENDIX V-4

ACRES OF RANGE SITES IN EACH ALLOTMENT IN THE EIS AREA
(continued)

Allotment	Dry Mountain Loam	Mountain Loam	Mountain Outwash	Mountain Swale	Mountain Meadow	Pine Grassland	Shallow Subalpine	Subalpine Loam	Alpine Slopes	Unclassified 1/
6102		270							2,037	1,715
6103	618			12	165	2,158		638		5,123
6104	189	31		14	67	5,538	307	319	1,054	21,280
6105		66	18		41	4,429		341		2,311
6106	769							196		273
6107	51,859			1,263	706	608	738	6,613		48,063
6108					161	2,013	1,893	194		5,808
6109					168		2,410			4,330
6111		280			65			920		3,025
6112					37		1,471	769		4,200
6113							59			
6114		66								78
6115						442		242	2,855	3,536
6116						456		61		230
6117	158		90			404				418
6120			27			593				282
6123						366		13		119
6125			52			45				
6127		1,034						750		
6128			1,105					750		118
6129			138							323
6130						69				16
6131			14			296				413
6132			10			12				
6150			15					237		45
6180		512		60		262	112			1,041
6200	1,279						331	398		350
6201	15									70
6202	6,238		47	343				964		1,675
6203	6,019	1,174			596			436	13	1,032
6204	401									
6205	76									
6206	2,501			14	57			73		383
6207						426		56		276
6208	2,848		193		100			218		299
6210	77									287
6212	210							75		136
6213								281		340
6216	1,427			114						92
6300	7,100	1,972		317				800		1,174
6301	12,309			201				1,293		981

APPENDIX V-4

ACRES OF RANGE SITES IN EACH ALLOTMENT IN THE EIS AREA
(continued)

Allotment	Dry Mountain Loam	Mountain Loam	Mountain Outwash	Mountain Swale	Mountain Meadow	Pine Grassland	Shallow Subalpine	Subalpine Loam	Alpine Slopes	Unclassified 1/
6302	8,815	1,512		10				80		1,100
6303	430									708
6304	2,211	745	18	130						720
6305	5,130			151						687
6306	261	261	47							88
6307	145									
6308	711				93					37
6309	2,851			12						194
6310	1,094									
6311	3,493	4,022	38	605	475			528		8,234
6312	21,448			1,064	234					7,513
6313	1,080	181		31				1,793		2,871
6314	493									76
6315	6			22				265		376
6316	3,663			18						143
6317	12,900		199	663	127					1,680
6318	11,997	1,012		177				2,034		635
6320	1,408		440							
6323	1,197		300	80						20
6324	54		412							
6325	844	263	9							
3626	1,131									77
6327	742							913		658
6328	645	1,110						1,227		1,521
6329	2,768	2,698	1,252							3,308
6338	920	10						259		392
6339			159							7
6342		276	2,126					81		523
6343		2,211	400		43			702		337
6344	922							205		905
6346			770					125		10
6347			939							889
6348			1,429		19					
6349			107							39
6350	195		1,082		33					71
6352	19									100
6353	1,040				100			70		367
6356	425	421								365
6357			329							
6359	602		57		11					47
6360	360		45							
6361	546							138		131
6362								1,182		463

APPENDIX V-4

ACRES OF RANGE SITES IN EACH ALLOTMENT IN THE EIS AREA
(continued)

Allotment	Dry Mountain Loam	Mountain Loam	Mountain Outwash	Mountain Swale	Mountain Meadow	Pine Grassland	Shallow Subalpine	Subalpine Loam	Alpine Slopes	Unclassified 1/
6365	241		26							
6366	37									
6369	40		10		10			123		
6370	83	82	397		10					
6371	80		210					150		150
6372	520	1,040	40					1,108		650
6373	506	500	45		10					1,061
6374	630		200		5			205		566
6375	329	325	150					203		40
6400								19		160
6401					70			300		343
6402					45					
6500								2,620		3,931
6501									645	448
6502									4,409	5,845
6503								1,580		3,868
6504								1,094	2,389	6,469
6505								552	3,476	6,572
6506								82	2,942	5,149
6507									841	453
6508									1,368	1,075
6509									3,734	1,869
6510									488	298
8900								213	389	3,579
8901									743	1,582
8902									4,168	2,053
8903								131	1,567	1,374
8904								59	271	1,047
8905								131	981	626
8906									664	1,212
8907									2,302	1,042
8908								165	842	1,643
8909								124	2,263	713
8911								183	4,514	1,403

APPENDIX S-1

APPENDIX S-1

GENERAL SOIL PROPERTIES -- GUNNISON AREA SURVEY

Range Site (acres) 1/	Series	Slope Percent	Effective Rooting Depth (inches)	Available Water Capacity	Hydrologic Soil Group 2/	Water Erosion Susceptibility 3/	Wind Erodibility Group 4/	Limiting Factors for Range Seeding 5/	Potential Forage Production (lbs/acre air-dry forage for unfavorable and favorable yrs.)
Dry Mountain Loam (190,545)	Cathedral	5-35	10-20	low	D	moderate	8	rd,awc,sl,cf	500-1,000
	Cheadle	5-45	8-20	low	C	slight	5	rd,awc,sl,cf	
	Corpening	5-40	10-20	low	D	moderate	3	rd,awc,sl	
	Hopkins	5-45	8-20	low	B	moderate-high	8	rd,awc,sl,cf	
	Mergel	5-45	gt 60 6/	low	B	moderate-high	5	awc,sl,cf	
	Spring Creek	5-40	10-20	low	C	moderate-high	6	rd,awc,st	
Mountain Loam (38,639)	Duffson	5-40	20-40	low	B	moderate	6	awc,sl,st	1,200-1,800
	Kezar	5-35	20-40	low	B	moderate	6	awc,sl,cf	
	Lucky	5-45	20-40	low	B	slight	6	awc,sl,cf	
	Morop	5-40	gt 60	high	C	moderate	8	sl,st	
	Parlin	5-45	gt 60	moderate	C	moderate-high	8	sl,cf	
Mountain Outwash (12,689)	Bosler	1- 8	gt 60	low	B	slight	3	awc	600-1,000
	Curecanti	1- 8	gt 60	low	B	slight	8	awc	
	Dewville	1-15	gt 60	moderate	B	moderate	6	none	
	Evanston	1-20	gt 60	high	B	slight-moderate	4	sl	
	Fola	1- 8	gt 60	low	B	slight	8	awc,cf	
	Redcloud	3-30	gt 60	moderate	B	moderate	8	sl,cf	
Mountain Swale (5,421)	alluvial land 7/	0- 5	gt 60	-	-	-	8	cf,st	2,000-3,000
Mountain Meadow (3,672)	alluvial land, wet 7/	0- 5	gt 60	-	-	-	8	cf,st,pd	2,000-4,000
Deep Clay Loam (393)	Dollard	5-30	20-40	low	C	slight-moderate	4	awc,sl	1,500-2,500
	Leaps	5-30	40-gt 60	high	C	moderate-high	6	sl	

APPENDIX S-1

GENERAL SOIL PROPERTIES -- GUNNISON AREA SURVEY
(continued)

Range Site (acres) 1/	Series	Slope Percent	Effective Rooting Depth (inches)	Available Water Capacity	Hydrologic Soil Group 2/	Water Erosion Susceptibility 3/	Wind Erodibility Group 4/	Limiting Factors for Range Seeding 5/	Potential Forage Production (lbs/acre air-dry forage for unfavorable and favorable yrs.)
Subalpine Loam (34,710)	Bogan	5-30	20-40	low	C	moderate	6	awc,sl	2,000-3,500
	Cebolia	5-30	gt 60	high	C	moderate	5	sl	
	Cochetopa	5-30	gt 60	high	C	moderate	6	sl	
	Gateview	2-30	gt 60	low	B	moderate	8	awc,sl,cf	
	Jerry	5-30	gt 60	moderate	C	moderate	6	sl	
	Kubler	5-35	gt 60	moderate	C	slight-moderate	5	sl	
	Mord	5-30	gt 60	high	C	slight-moderate	6	sl	
	Passar	5-30	gt 60	moderate	C	moderate-high	6	sl	
	Powderhorn	5-30	gt 60	high	C	moderate	5	sl	
	Sunshine	5-35	20-40	low	C	moderate-high	8	awc,sl	
	Youga	3-30	gt 60	high	B	moderate	5	sl	
	Youman	5-35	gt 60	high	C	moderate	6	sl	
Shallow Subalpine (7,055)	Ruby	5-40	10-20	low	B	moderate-high	5	rd,awc,sl,st,ro	775-2,500
Alpine Slopes (5,946)	Meredith	8-50	gt 60	low	B	high	8	awc,sl,st	500-1,200
Pine-Grassland (20,535)	Carbol	15-60	10-20	low	D	moderate	8	rd,awc,sl,cf,ro	750-950
	Posant	10-60	10-20	low	C	moderate-high	6	rd,awc,sl,ro	
	Woodhall	5-50	20-40	low	B	moderate-high	8	awc,sl,ro	
	Woosley	10-60	20-40	low	C	moderate-high	8	awc,sl,st,ro	

APPENDIX S-1

GENERAL SOIL PROPERTIES -- GUNNISON AREA SURVEY
(continued)

1/ Acres public lands

2/ Hydrologic soil groups (A, B, C, D) are based on the rate at which water enters the soil surface (infiltration) and the rate at which water moves within the soil (transmission). When both infiltration and transmission rates are high, little surface runoff occurs (hydrologic soil group A). In contrast, low infiltration and transmission rates produce high surface runoff (hydrologic soil group D). Groups B and C are intermediate.

3/ Water erosion susceptibility refers to the potential for surface soil loss when existing cover is removed or seriously disturbed.

4/ Wind erodibility group (WEG) is a group of soils having the same potential for soil blowing. Texture of the surface inch of soil has the greatest single influence on soil erodibility and is used as a guide for estimating WEG. WEGs 1 and 2 represent very high soil blowing hazard; WEGs 3 and 4 represent high soil blowing hazard; WEGs 5, 6, and 7 represent moderate soil blowing hazard; and WEG 8 represents slight soil blowing hazard.

5/ Limiting factors which may affect the successful establishment of range seedings are indicated. Also considered are machinery related limitations, e.g., presence of stones, rock outcrop, and excessive slope. The factors listed below do not imply that the corresponding soil cannot be seeded. On-site investigations will be needed to determine specific locations suitable for range seeding.

rd = shallow effective rooting depth (less than 20 inches)
awc = low available water capacity
sl = slopes greater than 15 percent were mapped for the corresponding series
cf = greater than 15 percent coarse fragments (gravel and cobbles) occur in the soils surface 7 inches
st = greater than 2 percent surface area occupied by stones
ro = greater than 2 percent surface area occupied by rock outcrop

6/ gt = greater than

7/ No series designation

APPENDIX S-2

APPENDIX S-2

SOIL EROSION RATES FOR THE GUNNISON BASIN
TONS/ACRE/YEAR

Range Site		Natural or Geologic	Present	Alternatives (Long Term)				
				MFP/Spring Rest and Fall Rest	No Action	Elimination of Livestock Grazing	Optimize Wildlife and Watershed Values	Optimize Livestock Grazing
Dry Mountain Loam	1	0.7	3.4	2.7	3.5	1.3	1.9	3.5
	2	0.7	3.4	1.2	NT	0.8	1.1	1.4
Mountain Loam	1	0.7	2.5	2.0	2.5	1.2	1.6	2.6
	2	0.7	2.5	1.1	NT	0.8	1.0	1.3
Mountain Outwash	1	0.4	1.8	1.3	1.7	0.6	0.9	1.9
	2	0.4	1.8	0.8	NT	0.5	0.6	1.0
Mountain Swale	1	0.02	1.0	0.46	1.03	0.06	0.17	1.03
	2	0.02	1.0	0.05	NT	NT	0.04	0.10
Mountain Meadow	1	0.01	0.13	0.08	0.13	0.02	0.04	0.13
	2	0.01	0.13	0.04	NT	NT	0.03	0.08
Pine Grassland	1	0.8	6.8	3.0	6.8	1.3	2.0	7.0
	2	0.8	6.8	1.2	NT	NT	1.0	1.5
Subalpine Loam	1	0.05	1.4	0.8	1.4	0.2	0.4	1.4
	2	0.05	1.4	0.2	NT	0.1	0.2	0.4
Shallow Subalpine	1	0.2	2.5	1.7	2.5	0.4	0.9	2.6
	2	0.2	2.5	NT	NT	NT	0.3	0.6
Average weight by acreage	1		3.1	2.3	3.2	1.1	1.6	3.2
	2		3.1	1.1	NT	0.7	0.9	1.2
	3		3.1	1.9	3.2	1.0	1.3	1.9

Note: The erosion rates for the Gunnison Basin portion of the EIS area are estimated approximations. A degree of accuracy corresponding to the decimal place to which an entry is carried out is not implied.

NT = No vegetation treatment proposed.

1. Impacts from allocation and grazing systems.

2. Impacts from allocation, grazing systems, and vegetation treatments on vegetation treated acreage only.

3. Impacts from allocation, grazing systems and vegetation treatments calculated for the total rangeland acreage in the Gunnison Basin portion of the EIS area.

Appendix S-2

PERCENT CHANGE IN SOIL EROSION RATE FROM THE PRESENT RATE

Range Site		Alternative (Long-Term)				
		MFP/Spring Fall	No Action	Elimination	Optimize Wildlife, Watershed	Optimize Livestock
Dry Mountain Loam	1	22 D	2 I	62 D	45 D	2 I
	2	65 D	NT	76 D	68 D	59 D
Mountain Loam	1	17 D	0	51 D	36 D	2 I
	2	56 D	NT	68 D	60 D	48 D
Mountain Outwash	1	28 D	3 D	67 D	51 D	2 I
	2	56 D	NT	73 D	67 D	45 D
Mountain Swale	1	54 D	3 I	94 D	83 D	3 I
	2	95 D	NT	NT	96 D	90 D
Mountain Meadow	1	41 D	0	84 D	69 D	0
	2	69 D	NT	NT	77 D	39 D
Pine-Grassland	1	56 D	0	81 D	70 D	2 I
	2	82 D	NT	NT	85 D	78 D
Subalpine Loam	1	38 D	0	85 D	67 D	0
	2	86 D	NT	93 D	86 D	71 D
Shallow Subalpine	1	35 D	0	84 D	65 D	2 I
	2	NT	NT	NT	88 D	76 D
Average weighted by acreage	1	27 D	1 I	66 D	49 D	1 I
	2	65 D	NT	77 D	73 D	61 D
	3	39 D	1 I	67 D	58 D	39 D

Note: D = Decrease in erosion rate; I = Increase in erosion rate.

1. Impacts from allocation and grazing systems.
2. Impacts from allocation, grazing systems, and vegetation treatments on vegetation treated acreage only.
3. Impacts from allocation, grazing systems, and vegetation treatments calculated for the total rangeland acreage in the Gunnison Basin portion of the EIS area.

NT = No vegetation treatments proposed.

Appendix S-2

PERCENT CHANGE IN SOIL COMPACTION FROM THE PRESENT LEVEL

Range Site		Alternative (Long-Term)				
		MFP/Spring Fall	No Action	Elimination of Livestock Grazing	Optimize Wildlife, Watershed Values	Optimize Livestock Grazing
Dry Mountain Loam		8 D	1 I	30 D	19 D	1 I
Mountain Loam		7 D	0	25 D	16 D	1 I
Mountain Outwash		16 D	2 D	57 D	35 D	1 I
Mountain Swale		28 D	1 I	103 D	65 D	1 I
Mountain Meadow		19 D	1 I	69 D	43 D	1 I
Pine-Grassland		11 D	0	40 D	25 D	1 I
Shallow Subalpine		12 D	0	45 D	28 D	1 I
Subalpine Loam		8 D	0	29 D	18 D	0
Average weighted by Acreage	1	8 D	1 I	31 D	20 D	1 I
	2	32 D	NT	44 D	36 D	28 D
	3	16 D	1 I	33 D	26 D	17 D

1. Impacts from allocation and grazing systems.
2. Impacts from allocation, grazing systems, and vegetation treatments on vegetation-treated acreage only.
3. Impacts from allocation, grazing systems, and vegetation treatments calculated for the total rangeland acreage in the Gunnison Basin portion of the EIS area.

NT = No vegetation treatments proposed.

APPENDIX W-1

APPENDIX W-1

USE OF WATER RESOURCES MODEL

The erosion and surface runoff for this EIS were computed by "HYDRO", which is a computer-based simulation program developed by Dr. Louis H. Hekman, Jr., and Dr. Martin M. Fogel of the University of Arizona at Tucson.

"HYDRO" estimates the hydrologic impacts (runoff and erosion) of specified livestock grazing systems on selected range sites within the jurisdiction of the BLM Montrose District Office. The basic components of "HYDRO" are (1) a stochastic event-based precipitation model for generating long term synthetic records, (2) a rainfall-runoff transformation relationship, (3) an expression describing the relationship between grazing, infiltration, and runoff curve number, and (4) an expression describing erosion as a function of runoff and the physical characteristics of a range site. The basic procedure employed in the program is the transformation of a large number of stochastically generated precipitation records into synthetic records of runoff and erosion production reflecting precipitation, watershed, and grazing conditions.

PRECIPITATION

Only the period May through October is represented in "HYDRO". This period generally corresponds to the summer thunderstorm season, a period of relatively short duration, high intensity convective storms.

Twenty years of data, from the following stations provided the data base for the precipitation model:

Cedaredge	6100'
Gunnison	7664'
Cochetopa	8000'
Crested Butte	8880'

Precipitation characteristics were further classified into three two-month periods, i.e., May-June, July-August, and September-October.

During the execution of the simulation program, it is only necessary for the user to specify the mean elevation of the area in question. Based on this information, the program determines the appropriate parameter values describing precipitation event amounts and interarrival time (time between precipitation events). During simulation, sequences of events are synthesized by randomly picking from these distributions.

RAINFALL-RUNOFF TRANSFORMATION

Standard Soil Conservation Service (SCS) methods were used in estimating the amount of runoff and peak flow resulting from a precipitation event. The peak flow component is a necessary input for the modified version of the Universal Soil Loss Equation (USLE) used in the study.

Estimating Runoff Amount

Storm runoff resulting from rainfall is expressed in the SCS equation (Soil Conservation Service, 1972) as

$$V = \frac{(R-A)^2}{(R-A) + S}$$

where V is runoff, R is storm precipitation, S is the potential maximum retention and A is the initial abstraction. All terms are expressed as depths. A runoff curve number (CN) is related to S by

$$CN = \frac{1000}{10+S} \qquad \text{or}$$

$$S = \frac{1000}{CN} - 10$$

For a given range site, CN is automatically determined by "HYDRO". A discussion of this process is contained in a following section of this Appendix. Initial abstraction A is considered a function of S, i.e., $A = K \cdot S$ where K is a fractional constant, usually 0.2, supplied by the user.

Estimating Peak Discharge

The peak discharge equation used by the SCS and incorporated into the model is

$$Q = \frac{484\ A \cdot V}{0.5\ D + 0.6\ Tc}$$

where Q = peak discharge in cfs,

A = watershed area in square miles,

V = runoff depth in inches,

D = duration of excess rainfall in hours, and

Tc = time of concentration in hours.

A, D, and Tc are model parameters, the values of which must be supplied by the user.

GRAZING, INFILTRATION, AND RUNOFF CURVE NUMBERS

The work of Gifford, Hawkins, and Williams (1975) and Hawkins and Gifford (1979) served as a basis for the procedures used to reflect the impact of grazing on runoff. Essentially the intensity and duration of grazing determines the soil infiltration rate which in turn, in conjunction with the vegetation type, is used to estimate the runoff curve number.

Grazing and Infiltration

Hawkins and Gifford (1979) modeled the response of infiltration rate to grazing systems comprised of three possible grazing intensities: rest (no grazing), moderate-light grazing, and heavy grazing. Inputs required are a grazing system schedule, initial infiltration rate, and a characteristic recovery rate for each individual grazing activity.

"HYDRO" assumes that the infiltration rate at the beginning of a simulation run reflects moderate-light grazing conditions. This initial rate is a user supplied input. Limits on the upper and lower infiltration rate extremes resulting respectively from prolonged rest and heavy grazing are determined from the following Hawkins and Gifford relationships:

$$f_u = 0.281 + 1.025\ f_{m/l}$$

$$f_h = 0.485 + 0.375\ f_{m/l}$$

where f_u, $f_{m/l}$ and f_h are target infiltration rates for no grazing (ungrazed), moderate-light grazing, and heavy grazing. Given the infiltration rate at the commencement of a specific grazing activity and the duration of that activity "HYDRO" determines the infiltration rate target level for that activity period and the daily increase (decrease) in rate required to reach that target in a stipulated recovery (depletion) time. During a specific activity period the change in rate is assumed to be linear. If an activity is of sufficient duration to enable the infiltration rate to reach the target value for that activity no further rate change occurs.

"HYDRO" assumes that no grazing takes place during the six month period November through April. Hence, during each simulation year there is a mandatory six months of recovery. This is handled automatically by "HYDRO".

Infiltration and Runoff Curve Number

"HYDRO" uses general equations developed by Hawkins (1977) to describe the runoff curve number as a function of vegetation type, percent cover density and infiltration rate. Upper and lower limits on percent cover density are required inputs to the model, while the actual cover density at any point during the simulation run is assumed to be a function of these two limits and the current and potential infiltration rates, i.e.:

$$CD = CD_l + (CD_u - CD_l) \cdot F/(F_u - F_h)$$

where CD = current percent cover density,

CD_l = lower limit percent cover density,

CD_u = upper limit percent cover density,

F = current infiltration rate,

F_u = target infiltration rate, ungrazed, and

F_h = target infiltration rate, heavy grazed.

The runoff curve numbers determined in the above manner are assumed to reflect antecedent moisture condition II. During the simulation run, five-day antecedent precipitation totals are tabulated for each event encountered and if antecedent moisture condition I or III is indicated the curve number is transformed accordingly by one of the following two equations:

$$CN_{I} = CN_{II}/(2.334 - [0.1334 \times CN_{II}])$$

$$CN_{III} = CN_{II}/(0.4036 + [0.0059 \times CN_{II}])$$

ESTIMATING EROSION

A modified form of the Universal Soil Loss Equation (Wischmeier and Smith, 1965) was used to relate runoff variables and watershed parameters to storm sediment yield. Proposed by Williams and Berndt (1972), the equation is

$$Z = 95\ (LS)CKP(V\cdot Q)^{0.56}$$

where Z = storm sediment yield in tons,

LS = slope length and gradient factor,

C = vegetal cover factor for undisturbed lands,

K = soil-erodibility factor,

P = erosion control practice factor,

V = volume of storm runoff in acre-feet, and

Q = peak discharge in cubic feet per second.

LIST AND DISCUSSION OF INPUT VARIABLES USED IN "HYDRO"

1. Elevation - Median elevations were determined for all range sites and rounded to the nearest 500 feet.
2. Time of Concentration - The method for determining a time of concentration for each range site consisted of:

a. Assume modeled watershed equal to one square mile.

b. Calculate the length and mean width of six representative watersheds in the EIS area, and from these, calculate a mean length to width ratio, which equaled 4.4.

c. By using a one square mile watershed, the mean length to width ratio, and the equation for the area of an ellipse, it was found that the mean one square mile watershed had a length of 2.4 miles and a width of .54 mile.

d. By using a mean percent slope for each range site the total change in elevation was calculated between the point of concentration and the most remote point in the watershed, 2.4 miles.

e. Kirpitches Formula was then used to calculate a time of concentration for each range site:

$$Tc = \left(\frac{11.9L^3}{H} \right)^{0.385}$$

where

Tc = Time of concentration in hours,

L = Distance to most remote point in the watershed (2.4 miles).

H = The change in elevation (feet) between the point of concentration and the most remote point in the watershed, which varies for each range site depending on its mean percent topographic slope.

3. Duration of Excess Rainfall - The duration of excess rainfall was assumed to be 1.5 hours at the lowest elevation. From there, it increased .02 hours per 500-foot rise in elevation which is proportional to the average storm size increase for the same change in elevation.

4. Antecedent Moisture Condition Boundaries - The antecedent moisture condition boundary was assumed to be .90 inch to 1.60 inches for the lowest elevation. Both the upper and lower boundaries increased from there, .03 inch per 500-foot increase in elevation which is the average storm size increase for the same change in elevation.

5. Recovery Time - Given a continuous rest, it is assumed that the physical soil properties, under livestock use, needs 15 years to completely recover to pre-grazing conditions. The lack of frost heaving in the EIS area is the primary factor requiring the long recovery time. This input was held constant for all range sites. Montrose District BLM Division of Resources personnel were consulted for this assumption.

6. Depletion Time - With continuous heavy or moderate/light grazing, it is assumed that the time needed for the physical soil properties to reach their worst condition is six months and 18 months respectively. Montrose District BLM Division of Resources personnel were consulted for this assumption.

7. Upper and Lower Limits on Cover Density - The upper and lower limits on cover density were obtained from estimates of the optimum canopy cover of each potential plant community and the lowest likely canopy of each range site after continuous heavy grazing. John Murray, SCS range conservationist, was consulted and the data from the 1978 range and wildlife survey was also utilized.

8. Initial Infiltration Capacity - These were measured in the EIS area during the summer of 1978 under a moderate/light grazing intensity.

9. Soil Erodibility Factor (K) - These were obtained from the official SCS Form 5 for each soil series.

10. Topographic Factor (LS) - These were calculated by measuring percent slope and slope length on ten randomly selected transects for each range site delineated on 7.5 minute topographic quadrangle maps of the EIS area. The slope measurements were then converted to an LS factor.

11. Vegetation Factor (C) - This was obtained by converting mean present canopy and basal vegetative cover for each range site as measured during the 1978 range and wildlife survey, to a C factor. SCS guidelines were used for the conversion.

12. Erosion Control Practice Factor (P) - A factor of one was used for all range sites, as recommended by the Pacific Southwest Interagency Committee (1974).

The outputs from "HYDRO" used in this EIS are the change in the infiltration capacity, volume of surface runoff, and the amount of erosion, for each range site under all of the alternatives (see Table W-1.1).

The field measured infiltration capacities were used in "HYDRO" to predict the infiltration capacities under the present and no graze conditions for each range site. Infiltration capacities for the other alternatives were then calculated using the present and no graze infiltration capacities and the initial stocking rate for livestock under each alternative. A computer run was then made for each infiltration capacity under every alternative for all range sites. These computer runs were done with 250 years of simulated precipitation to produce the mean volume of surface runoff and erosion per grazing season.

The erosion per grazing season was converted to annual erosion rate by correlating the no-graze erosion rate to the natural erosion rate for each range site. The affect of sagebrush control on long term erosion rates was approximated utilizing the estimated increase in vegetation cover and extrapolating the erosion rate without sagebrush control.

Short term erosion increases due to vegetation treatments was estimated for mechanical treatments and burning. Spraying was determined to not increase short-term erosion. The Universal Soil Loss equation was used to predict erosion on the treated acres based on the changes in the vegetation cover. A soil surface disturbance or alteration factor was added to account for the physical changes in the soil resulting from the vegetation treatment techniques.

VEGETATION MANIPULATIONS

The infiltration capacities for short and long term vegetation manipulations were calculated from the original data produced by "HYDRO" (see Table W-2) and data from Gifford (1972). A linear regression analysis was then used to produce a line equation predicting surface runoff volume given an infiltration capacity.

SEDIMENT PRODUCTION

Since channel erosion was not quantified in this EIS, a sediment delivery ratio (the ration of sediment yield to gross erosion [channel and surface erosion] expressed in percent) could not be calculated. Therefore, sediment production is assumed to vary proportionately to surface erosion but at a different level of volume. As a result, sediment changes throughout this EIS are not expressed as an absolute number, but as a percent change from the present condition.

RIPARIAN HABITAT

The increases or decreases in the hydrologic condition of the riparian are directly correlated with the increase or decrease in that area's basal vegetation cover.

WATER QUALITY

The total coliform counts for Chapter 4 were determined from the increase or decrease in total AUM allocation (livestock and wildlife) and the present public land vs. private land within the EIS area.

TABLE W-1.1

AVERAGE VALUES OF INFILTRATION CAPACITY AND ANNUAL GRAZING SEASON SURFACE RUNOFF FOR THE MAJOR RANGE SITES

Range Site	Present	MFP/Spring Rest and Fall Rest	Continuation	Elimination	Optimize Wildlife & Watershed	Optimize Livestock
Dry Mountain Loam	1.98/.2366*	2.14/.1870	1.97/.2401	2.58/.0940	2.36/.1340	1.97/.2401
Mountain Loam	1.77/.2436	1.89/.2033	1.77/.2436	2.22/.1222	2.05/.1595	1.76/.2473
Mountain Swale	1.17/.2745	1.50/.1298	1.16/.2815	2.37/.0189	1.93/.0518	1.16/.2815
Mountain Meadow	1.06/.0885	1.26/.0530	1.05/.0885	1.79/.0150	1.52/.0283	1.05/.0885
Subalpine Loam	2.23/.0165	2.41/.0104	2.23/.0165	2.88/.0028	2.64/.0057	2.23/.0165
Pine-Grass	1.64/.3754	1.82/.1687	1.64/.3754	2.29/.0746	2.05/.1138	1.63/.3813
Mountain Outwash	1.27/.9665	1.47/.6968	1.29/.9337	1.99/.3283	1.72/.4793	1.26/.9836
Shallow Subalpine Loam	2.06/.1985	2.31/.1334	2.06/.1985	2.98/.0350	2.64/.0734	2.05/.2016

* First number represents the infiltration capacity in inches per hours, and the second number represents the surface runoff in acre-feet per square mile.

APPENDIX F-1

APPENDIX F-1

ESTIMATED MILES OF STREAM HABITAT IN THE EIS AREA

Stream Name	Approximate Total Miles 1/	Approximate BLM Miles	Percent BLM	General Aquatic Habitat Condition 2/
Gunnison River (+Blue Mesa)	44.42	28.60	64.4	ND
Cimarron River	14.51	1.00	6.9	ND
*Little Cimarron River	12.21	1.25	10.2	11.0
*Van Boxel Creek	6.00	3.75	62.5	17.0
Moore Pasture Creek	2.50	1.80	72.0	ND
East Fork Little Cimarron	3.22	1.00	31.0	ND
Mesa Creek	4.00	1.20	30.0	ND
Black Mesa Creek	2.80	1.00	35.7	ND
Round Corral Creek	3.20	1.10	34.4	ND
Curecanti Creek	3.60	1.00	27.8	ND
Blue Creek	3.20	2.00	62.5	ND
Big Blue Creek	25.00	3.50	14.0	ND
Middle Blue Creek	9.00	2.00	22.2	ND
West Fork Blue Creek	2.00	1.00	50.0	ND
Little Blue Creek	8.00	0.90	11.2	ND
East Fork Blue Creek	4.60	1.80	39.1	ND
Corral Creek	3.40	0.80	23.5	ND
Cottonwood Creek	3.40	0.20	5.9	ND
Pine Creek	14.00	3.20	22.9	ND
*Lake Fork Gunnison	50.00	15.75	31.5	12.0
*Willow Creek	15.40	4.25	27.6	11.5
East Fork Willow Creek	2.20	1.50	68.2	ND
*Indian Creek	10.60	7.75	73.1	11.0
Yeager Gulch	4.00	1.50	37.5	ND
Cherry Creek	2.00	1.00	50.0	ND
*Trout Creek	7.20	5.00	69.4	11.0
*Fourth of July Creek	4.60	3.25	70.6	11.0
*Larson Creek	1.40	0.75	53.6	20.0
*Henson Creek	17.00	13.50	79.4	14.5
Crystal Creek	0.50	0.25	50.0	ND
Alpine Gulch	2.50	2.50	100.0	ND
Nallie Creek	0.50	0.50	100.0	ND
*El Paso Creek	1.20	1.00	83.3	18.0
*North Fork Henson Creek	3.00	2.50	83.3	15.0
Mineral Creek	1.40	0.45	32.1	ND
Bent Creek	3.00	2.80	93.3	ND
Catarack Gulch	1.60	1.50	93.8	ND
*Cottonwood Creek	4.00	3.63	90.7	14.0
Silver Creek	0.50	0.50	100.0	ND
Cooper Creek	5.00	3.00	60.0	ND

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* Streams considered as critical fishery habitat for Gunnison Basin URA-3. No data collected on the rest.

1/ Miles of streams were measured from BLM surface management quads No. 3, 4, 9, 10 and 15 (Range).

2/ Habitat Condition: greater than or equal to 16 = Excellent; 14-15 = Good; 10-13 Fair; less than 10 = Poor. ND = No data.

APPENDIX F-1

ESTIMATED MILES OF STREAM HABITAT IN THE EIS AREA
(continued)

Stream Name	Approximate Total Miles 1/	Approximate BLM Miles	Percent BLM	General Aquatic Habitat Condition 2/
Four Mile Gulch	4.00	0.20	5.0	ND
*Red Creek	4.80	2.00	41.7	14.0
*Goose Creek	6.40	2.75	43.0	ND
*Cebolla Creek	28.80	6.25	21.7	15.5
Wolf Creek	3.20	3.20	100.0	ND
*East Fork Powderhorn Creek	13.50	13.50	100.0	15.2
*Mid Fork Powderhorn Creek	13.20	10.25	75.9	13.5
*West Fork Powderhorn Creek	9.00	8.00	88.9	17.0
Beaver Creek	6.00	4.00	66.7	ND
*Rock Creek	11.00	4.75	43.2	12.0
*Spring Creek	1.00	0.31	31.0	11.0
*East Elk Creek	4.20	1.75	49.0	ND
*North Willow Creek	4.60	3.00	65.2	12.0
*Stevens Creek	4.00	2.31	57.8	15.0
Steuben Creek	4.40	1.60	36.4	ND
*South Willow Creek	15.00	6.00	40.0	10.5
*Pole Creek	8.00	8.00	100.0	15.0
*Gold Basin Creek	10.00	6.50	65.0	4.0
*Sugar Creek	8.40	8.00	95.2	6.0
*Beaver Creek	5.40	1.00	18.5	12.0
*South Beaver Creek	16.00	8.75	54.7	14.5
Tomichi Creek	29.20	0.20	0.7	ND
*Antelope Creek	8.60	2.50	29.1	7.0
*West Antelope Creek	5.40	3.75	69.4	10.0
*Cabin Creek	6.00	5.00	83.3	11.0
Dry Gulch	6.00	5.80	96.7	ND
*Cochetopa Creek	29.20	7.25	24.8	16.5
*Rock Creek	2.20	2.00	90.9	19.0
*Los Pinos Creek	7.28	1.10	15.1	16.0
Trail Creek	3.20	0.50	15.6	ND
*Pauline Creek	2.60	1.50	57.7	16.0
*Alder Creek	4.00	2.75	68.7	15.0
Big Gulch	3.00	1.50	50.0	ND
Wood Gulch	4.00	2.00	50.0	ND
*Razor Creek	9.00	0.50	5.5	5.0
*Hot Springs Creek	4.40	1.10	25.0	18.0
Big Draw	1.50	1.00	66.6	ND
Needle Creek	2.60	0.50	19.2	ND
Owens Creek	0.40	0.10	25.0	ND
*Animas River (West Fork)	16.40	2.00	12.2	16.0
Molas Creek	2.00	2.00	100.0	ND
Bear Creek	0.75	0.75	100.0	14.0
*Mineral Creek	1.50	0.50	33.4	14.0
Cement Creek	8.40	4.80	57.1	ND
Arrastin Creek	2.80	1.00	35.7	ND

ESTIMATED MILES OF STREAM HABITAT IN THE EIS AREA
(continued)

Stream Name	Approximate Total Miles 1/	Approximate BLM Miles	Percent BLM	General Aquatic Habitat Condition 2/
Cunningham Creek	2.00	0.40	20.0	ND
Mountaineer Creek	1.70	1.70	100.0	ND
South Fork Animas River	3.00	1.50	50.0	ND
Eureka Gulch	3.00	1.00	33.3	ND
California Gulch	2.20	1.20	54.5	ND
*Cinnamon Creek	2.00	2.00	100.0	16.0
Uncompahgre River	1.00	0.60	60.0	ND
Mineral Creek	1.50	0.50	33.4	ND
Cow Creek	0.80	0.80	100.0	ND
Wildhorse Creek	1.00	1.00	100.0	ND
TOTAL	649.79	302.95	47.0	

APPENDIX F-2

APPENDIX F-2

AQUATIC AND RIPARIAN HABITAT (INTERRELATIONSHIPS)

Alteration of the aquatic/riparian ecosystem complex is thought to be one of the more significant causes of (species) extinction, i.e., when wildlife niches are altered, they must move, adapt, or die (Davis 1977). It has been shown that riparian habitats provide living conditions for a greater variety of (aquatic and terrestrial) wildlife than any other habitat type found and are of paramount importance in producing and maintaining biotic diversity. They are the most critical wildlife habitat types in the managed rangelands, with more wildlife species depending entirely upon, or spending disproportionately more time in, this habitat than in any other (Thomas et al. 1977).

Riparian zones (Figure 1, Appendix F-3) can be identified by the presence of vegetation that requires free or unbound water or conditions that use more moisture than normal (Thomas et al. 1978). They are streams, lakes and wet areas, and adjacent vegetative communities which are predominantly influenced by their association with water (Riparian Habitat Subcommittee of the Oregon/Washington Interagency Wildlife Committee-(R.H.S.) 1979) and are characterized by species and/or life forms that are different from those of the immediately surrounding non-riparian climax (Lowe 1964, as cited by Brown et al. 1977). The riparian vegetative type is normally found at the interface between the aquatic and terrestrial environments and is not only influenced by its association with water but has a direct influence on the aquatic ecosystem. The riparian system contains elements of both aquatic and terrestrial ecosystems plus retaining unique characteristics found in none of the other habitat types.

APPENDIX F-3

APPENDIX F-3

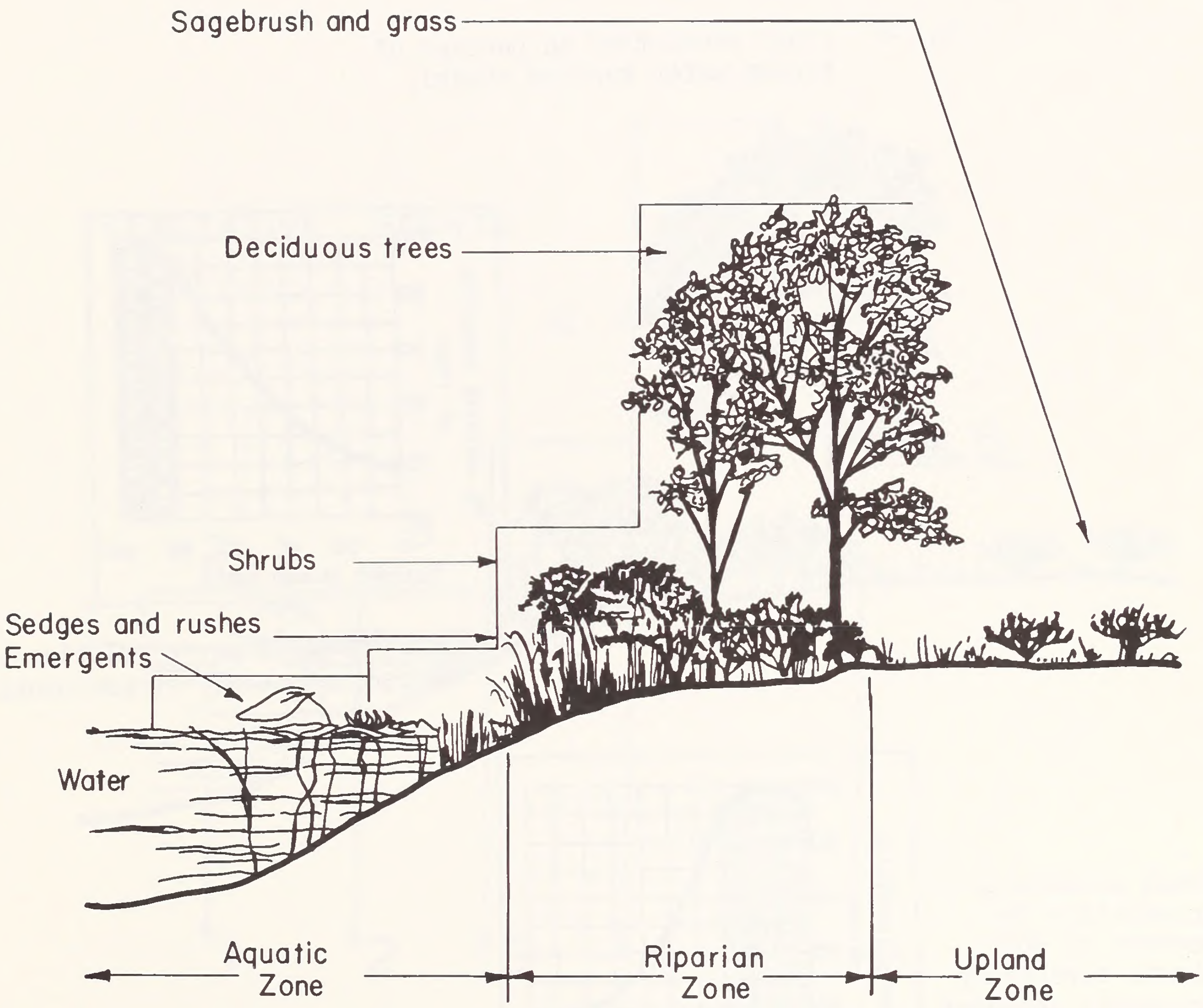


Fig. l. Riparian zones are identified by the presence of vegetation that requires large amounts of free or unbound water.

(Source: Thomas et al. 1978).

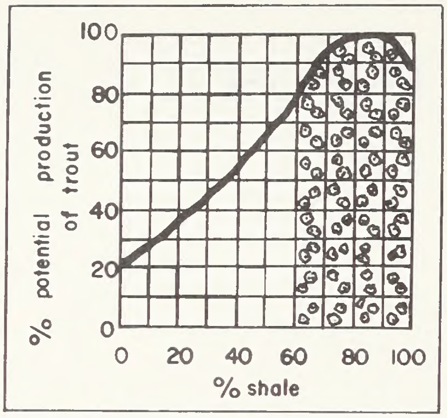


Fig. 2. Trout production to percent of stream water surface shaded.

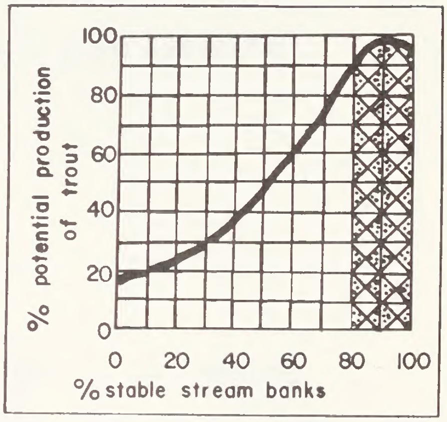
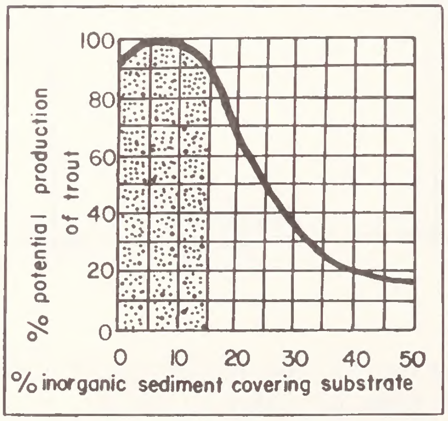


Fig. 3. Trout production in relation to percent of stable stream banks.

Fig. 4 Trout production in relation to percent of substrate covered by inorganic sediment.



(Source: Riparian Habitat Subcommittee of the Oregon/Washington Interagency Wildlife Committee, 1979)

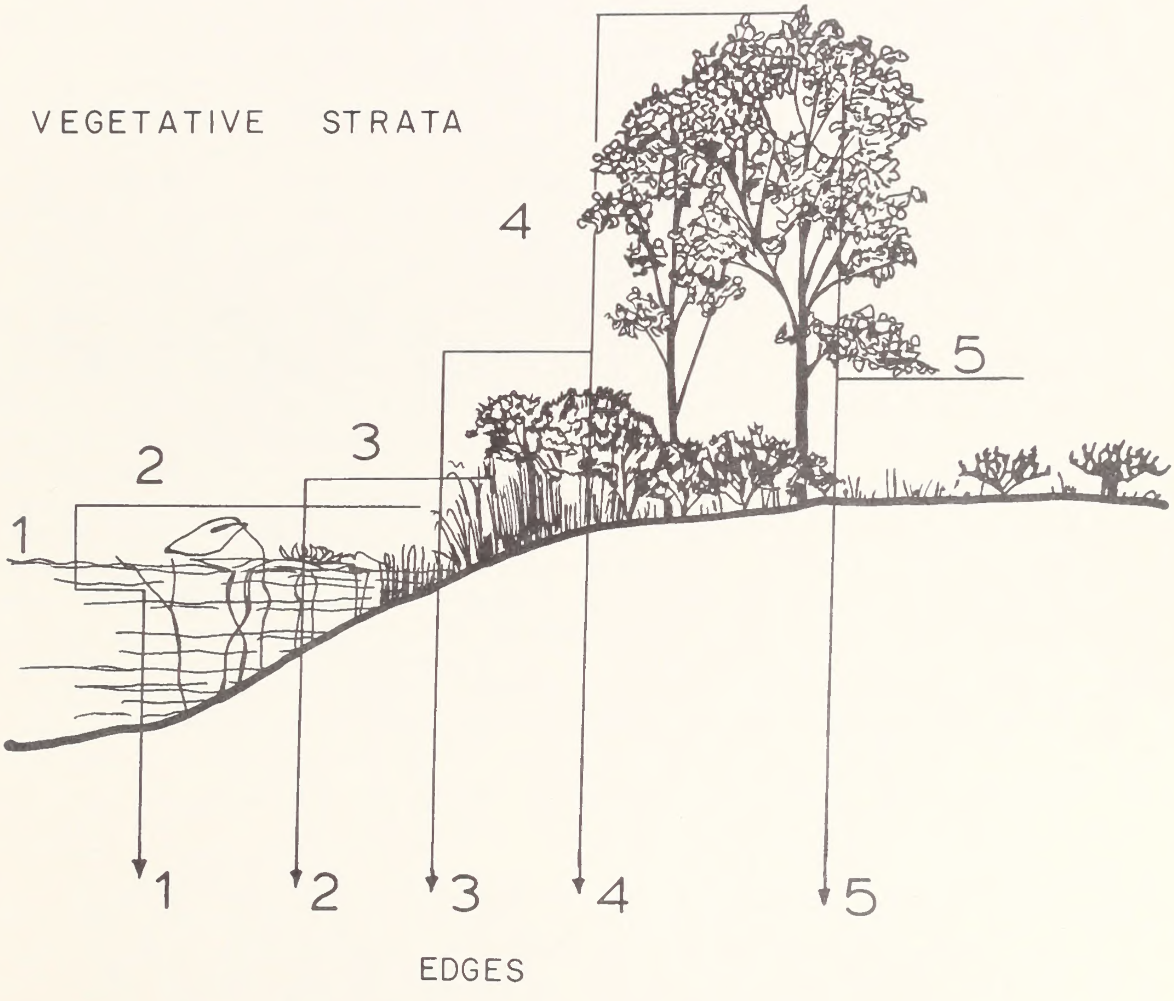


Fig. 5. Riparian zones frequently have a high number of edges and strata in a comparatively small area. This produces habitat for a greater number of species, reflecting the diversity of plant species community structure.

(Source: Thomas et al. 1973).

APPENDIX F-4

ADDITIONAL FACTORS TO CONSIDER IN AQUATIC RIARIAN ASSOCIATION

Food

Woody debris and leaves are the two major allochthonous components entering the stream from the riparian zone. These two components function in different ways in relation to quality, quantity, and turnover time of standing crop. There appears to be a definite order in the breakdown rates of organic debris, with the leafy materials being utilized more rapidly than the woody materials, thus producing a continuous food supply for aquatic organisms during critical periods of food shortage. Fisher and Liken (1973) and Sedell et al. (1973) found that 99.0 percent of the annual energy input to small streams is imported from the terrestrial surroundings with 1.0 percent attributable to primary production. It was further stated that about 60 to 70 percent of the organic inputs entering the stream system are retained long enough to be biologically utilized by stream organisms (Meehan et al. 1977). In terms of the importance of riparian vegetation as a food source leading to fish production, Chapman (1961) in his studies on coho salmon found that 66 percent of the total intake leading to coho production was derived from allochthonous sources either directly as terrestrial insects or indirectly as aquatic insects that fed upon terrestrial detritus. Broken down, the mean occurrence (by dry weight) of terrestrial animals in the diet of coho was about 30 percent while aquatic insects made up 53 percent. Concerning the food habits of aquatic insects consumed by coho, Chapman (1961) estimated that 51 percent of these organisms were dependent on allochthonous energy sources, 12 percent were dependent on autochthonous sources (primary production) and 36 percent subsisted on diets of unknown origin. Armour (1978) cited studies which indicated that members of five aquatic insect orders comprised 92 percent of the number of organisms eaten by brook and cutthroat trout. It would appear from a review of these sources and others that streamside vegetation is an extremely critical component of the aquatic/riparian ecosystem in providing both direct and indirect sources of food for aquatic invertebrates and vertebrates. By contributing to stream productivity through the input of organic material and nutrients which are utilized by various components of the stream biota, a relationship is established which directly affects fish production by influencing the basic components of the food chain upon which fish are dependent.

Habitat

Another important aspect of the aquatic/riparian relationship is that the presence of streamside vegetation provides habitat for aquatic, semi-aquatic, and terrestrial organisms. Many aquatic organisms are dependent on terrestrial vegetation for habitat during the adult stage, for emergence, and for egg deposition. Many of these organisms are dependent on over-hanging vegetation or structural materials, such as tree boles, to insure re-introduction of emerging nymphs and larvae into the aquatic system. Overhanging vegetation is also a source of fish food in the form of terrestrial insects associated with the habitat formed by the various strata of the riparian zone (Figure 5, Appendix F-2). Terrestrial insects frequently fall into the streams and become one of the food items referred to previously.

Species Diversity

The mainenance and preservation of the aquatic/riparian association results in added diversity due to the variability of habitat provided by these two ecotypes. It has been suggested by Erman et al. (1978) that diversity (of habitat, food, or species) is thought to be closely tied to ecosystem stability. Meehan et al. (1977) stated that the differences in invertebrate biomass on leaves and wood can be attributed to differences in food quality. Sands and Howe (1977) have stated that reduced variability of the biological community can be attributed to the loss of variability in the physical environment. Short et al. (1978) have indicated that low diversity of taxa within the aquatic system may be indicative of a stressed situation. First to third order streams have been found to be low in primary production and high in invertebrate diversity (Cummins 1974) and invertebrate diversity appears to be indicative of habitat diversity which seems to be a reflection of habitat stability.

Since changes in the energy budget of a stream appear to cause a change in the invertebrate fauna, it seems reasonable to assume that this diversity index could be a valuable tool for assessing the need for specific management practices. This is especially critical for streams running through or adjacent to BLM lands that lack the quality of aquatic and riparian habitat brought about a diverse system. The use of aquatic insects in diversity indices has gained wide acceptance in recent years as a method of quantifying changes in the biota due to environmental changes. Aquatic insects can be important indicators of environmental stress, change, or pollution. Therefore, the use of indicator organisms could become an important aspect of aquatic/riparian habitat management which stresses the importance of maintaining a healthy, viable population of aquatic organisms.

Perennial vs. Intermittent Streams

There appears to be a relatively high percentage of intermittent streams in the GBRA that constitutes part of the data void mentioned previously.

When considering the ability of a stream to support aquatic life based on its classification as perennial or intermittent, it is important to note that whether or not a stream supports a fishery is not the single most important criteria to consider in the management of that particular system. These small, periodically intermittent, headwater streams in the GBRA can be extremely important in terms of the support they provide for the downstream fishery. Many of the aquatic food organisms appear to be just as dependent on the aquatic/riparian ecosystem provided by intermittent streams as fish are on perennial streams.

The ability of these insects to adapt to their environment is one of the primary factors that has made this class so successful in occupying virtually every niche made available. Tew (1970) found that some species of aquatic insects are able to survive the arid summer conditions as drought resistant eggs, larvae, and/or adults, or in the terrestrial environment as quiescent adults having ovarial diapause. Tew (1970) further stated that some aquatic species of insects have developed up to a four year life cycle in intermittent streams and larvae survive the drought periods by burrowing into the streambed and aestivating. Short et al. (1978), in their qualitative sampling of two intermittent streams, found a fairly diverse collection of macroinvertebrates were present. An important aspect in the life histories of aquatic insects is that many of them, after emergence as adults, will migrate upstream for mating and egg laying activities. Presumably, this includes intermittent portions of streams for some species. Since trout are known to feed primarily on drifting food organisms, the cycle is completed as emerging insects in various life history stages drift downstream and become available as food for trout species. It is, therefore, important to consider intermittent streams just as critical to the proper maintenance and perservation of the total ecosystem as are perennial streams.

In terms of the influence of riparian vegetation on perennial and intermittent streams, Meehan et al. (1977) view the stream system as a continuum in which (proceeding downstream from the headwater region) the decreasing direct influence of adjacent vegetation of the watershed and the increasing importance of input from upstream tributary systems is a basic feature. The influence of riparian vegetation will vary with stream order and position along the continuum (refer to Leopold et al., 1964, for a description of stream orders). The first to third order headwater streams are maximally influenced by riparian vegetation primarily because the ratio of stream bottom to shoreline is highest among these smaller streams (Meehan et al. 1977). One feature that most of the smaller stream systems appear to have in common is their dependence for the majority of their energy supply on the input of organic material elaborated in the terrestrial system through which the stream flows (Chapman 1974). This dependence of first to third order streams on an energy base produced outside the aquatic system (allochthonous materials) has resulted in streams that are low in primary production (heterotrophic). The shift from heterotrophy to autotrophy (most of the food supply is produced within the system) normally doesn't occur until about the time the stream becomes fourth order.

Due to the general lack of streamside vegetation, many of the streams in the GBRA don't fit this description since they have increased temperatures and exposure resulting in a relatively high degree of primary production which has caused many of them to become somewhat autotrophic. In these small intermediate sized perennial and intermittent streams typical of the GBRA, the riparian vegetation would normally exercise important controls over the physical condition of the aquatic environment. This energy interdependence should follow a gradient with streams at higher elevations likely to be more dependent on outside sources of energy for the aquatic organism food base. In the GBRA much of these aquatic/riparian interrelationships appear to be less pronounced due primarily to a paucity of riparian vegetational species essential to the maintenance of this association.

APPENDIX F-5

APPENDIX F-5

IMPORTANCE OF BUFFER ZONES TO RIPARIAN ZONES

In order to minimize the potential impacts of herbicides on non-target areas, stringent guidelines should be established and enforced. Probably the most important guideline to consider is the leaving of bufferstrips between the spray units and the riparian and aquatic zones.

The use of buffers to minimize adverse impacts on aquatic and riparian quality is considered an important guideline for the protection of habitat quality. Some of the indirect adverse effects of eliminating buffer zone vegetation may be: 1) temporary loss of the vegetative canopy which provides thermal stability; 2) removal of over-hanging vegetation which provides protection from predation; 3) possible decrease in streambank stability; 4) loss of fish food input in the form of various terrestrial insects; 5) reduced input of organic material which is an essential food source for aquatic invertebrates; and 6) loss of critical habitat for aquatic insect adults. As Kimmins (1975) points out, some of the indirect effects of herbicides on fish and other aquatic organisms may be more serious than the direct toxic effects. Cameron and Anderson (1977) concluded that the 200-foot buffer strips along Class I streams and 100-foot buffer strips along Class II streams were effective in providing aquatic habitat protection since all of the water samples collected and analyzed contained herbicide concentrations that were below the EPA recommended safe level for fish.

APPENDIX VRM-1

APPENDIX VRM-1

DETERMINATION OF VISUAL RESOURCE MANAGEMENT (VRM) CLASSES

VRM classes comprise scenery quality, visual sensitivity levels, and distance zones.

Scenery quality is determined from a quantified scenic evaluation process. Three quality ratings result: outstanding (a), characteristic (b), and minimal (c).

Visual sensitivity levels are an index of the relative importance or value of visual response to an area. Commonly considered criteria are:

1. Traffic counts for highways and roads,
2. Recreation uses of public land types, use counts, local, regional, national significance,
3. Community attitudes,
4. Land use relationships.

Distance zones are important because, in most cases, the closer viewers are to an object, the more contrast or detail they see. The distance zones are:

1. Foreground: from 0 mile to 0.5-1 mile,
2. Middleground: from 0.5-1 mile to 3-5 miles,
3. Background: from 3-5 miles to 15 miles;
4. Seldom seen: beyond 15 miles or in closer areas which are screened by landform or vegetation from the common viewing points. After the above VRM class combinations are determined, they are then compared with a chart to determine the VRM classes.

Determination of Visual Impact

Whether or not a proposed project would create a visual impact is determined through the use of the contrast rating. Each type of proposed project is quanitatively analyzed to determine the degree of contrast each would create in the characteristic landscape of each VRM class. For example, what deviations form the basic elements (form, line, color and texture) of the landscape features (land/water form and vegetation) were caused by the addition of structures or alterations to the existing landscapes. Initially, this study is not site-specific, but assumes optimum viewing conditions. The quantitative analysis of the contrast ratings are then compared with the numerical limits for each VRM class. Contrast ratings greater than the limits for the VRM classes are considered to be discordant or unacceptable visual impacts. Those contrast ratings within the limits of the VRM classes create harmonious or acceptable visual impacts. Contrast ratings were prepared in each characteristic landscape for each type of activity in the proposed action and each alternative using worst case situations. Visual Contrast Rating Summary displays the results of this step of the analysis.

The acceptable contrast rating (BLM Manual 6320.11) for each Visual Resource Management Class is:

1. Class II - The degree of contrast for any one element should not exceed 2 (moderate), and a total contrast rating for any feature may not exceed 12.
2. Class III - The degree of contrast for any one element should not exceed 2, and the total rating for any feature should not exceed 16.
3. Class IV - The total contrast rating for any feature should not exceed 20.

APPENDIX SE-1

ALLOTMENT LOCATIONS

Characteristic Landscape Types	Allotments
1	
2	5209, 6000, 6001, 6003, 6004, 6006, 6010, 6011, 6016, 6017. 6022, 6026, 6034, 6036, 6055, 6056, 6100, 6101, 6105-6107, 6120, 6200, 6201-6206, 6208, 6210, 6212, 6213, 6216, 6217, 6250, 6251, 6300, 6301-6314, 6316-6320, 6323-6329, 6338, 6339, 6342-6344, 6346-6350, 6353-6375, 6999
3	6015, 6100, 6103, 6104, 6108, 6115, 6116, 6123, 6127, 6131, 6133
4	6001, 6003-6009, 6013, 6014, 6016, 6018-6021, 6024, 6027, 6029-6033, 6037, 6040, 6050-6056, 6060-6062, 6100, 6102-6109, 6111-6117, 6125, 6127-6131, 6133, 6134, 6150, 6180, 6202, 6203, 6207, 6210, 6215, 6216, 6311, 6313, 6315, 6329, 6369-6374, 6400, 6500-6503, 6508
5	6102, 6115, 6500, 6502, 6504-6510, 8900-8911
6	6100, 6107, 6132, 6401, 6402, 6500, 6502, 6504-6510, 8900-8909, 8911
7	6010, 6034, 6055, 6100, 6101, 6356, 6372, 6503, 6505, 8905, 8910, 8911

APPENDIX SE-1

APPENDIX SE-1

USE OF SOCIOECONOMIC COMPUTER MODEL

To estimate the economic impacts of the various alternatives the ranch models and information presented in the draft of "Economic Effects of Reduction in Federal Grazing Upon the Economy of Colorado," by Bartlett, Taylor, and Mack was used. The following is a brief summary of the modeling techniques used and how the models were manipulated to estimate impacts.

For the ranch budget study the state of Colorado was divided into five grazing regions to ensure the longevity of the ranches. A random sample of ranches using federal forage in each region was then interviewed. Basic information about herd size, type of operation, source of feed, operating costs, and revenues were obtained. For the southwest region which encompasses the EIS study area ranches were segregated into eight groups according to size and type of operation. There were four cattle only budgets, two sheep only, and two cattle and sheep combination budgets developed.

To assess the effects of federal grazing reductions budgets of each ranch model were incorporated into a linear program framework. The livestock inventory was given forage requirements for each season and the forage budget of the ranch was allocated among the seasons according to current utilization. Each forage source (federal, state, deeded or leased) was charged with respective 1977 prices, and livestock costs and revenues were incremented in the program on a per-cow or ewe basis. The basic technique was to reduce federal forage, thereby inducing a change in livestock production and production costs.

In all models reductions in livestock variables (defined as any cost or revenue that was incremented on a per head basis) were linear or a constant rate of reduction was experienced for all levels of grazing cuts. However, the rate of reduction was not equal between models. The greater dependence a model has on federal forage, the more severe the reduction in livestock variables. Table 1 shows the percentage in livestock production variables per percent in reduction in federal forage.

For the EIS the percentage reduction for each model group was multiplied by the appropriate factor from the above table and ranch revenues and variable costs were adjusted by the resulting amount. This process was repeated for each of the eight models for each alternative.

TABLE 1

PERCENTAGE REDUCTION IN LIVESTOCK PRODUCTION VARIABLES PER PERCENT REDUCTION IN FEDERAL FORAGE, SOUTHWEST REGION

Model	Percent Reduction
Cattle I	.44679
Cattle II	.76399
Cattle III	.62888
Cattle IV	.32648
Sheep I	.85609
Sheep II	.8596
Both I Cattle	.42744
Sheep	.67552
Both II Cattle	-- 1/
Sheep	.85964

1/ Cattle on this model do not use federal forage

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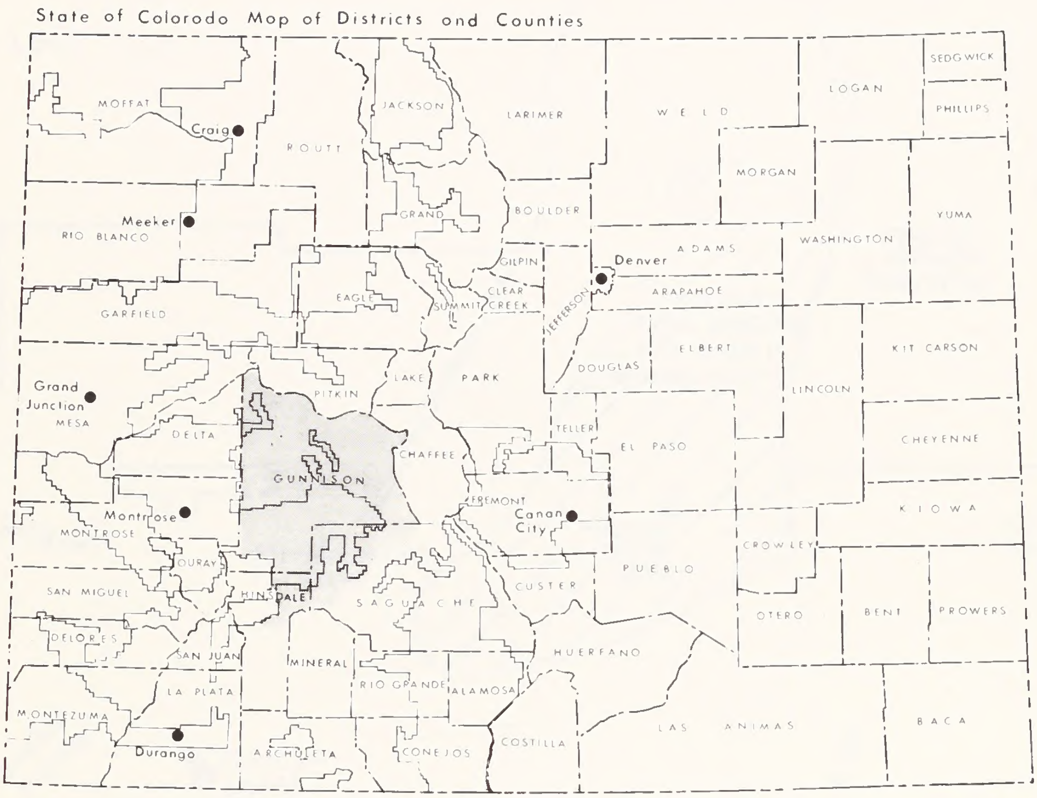
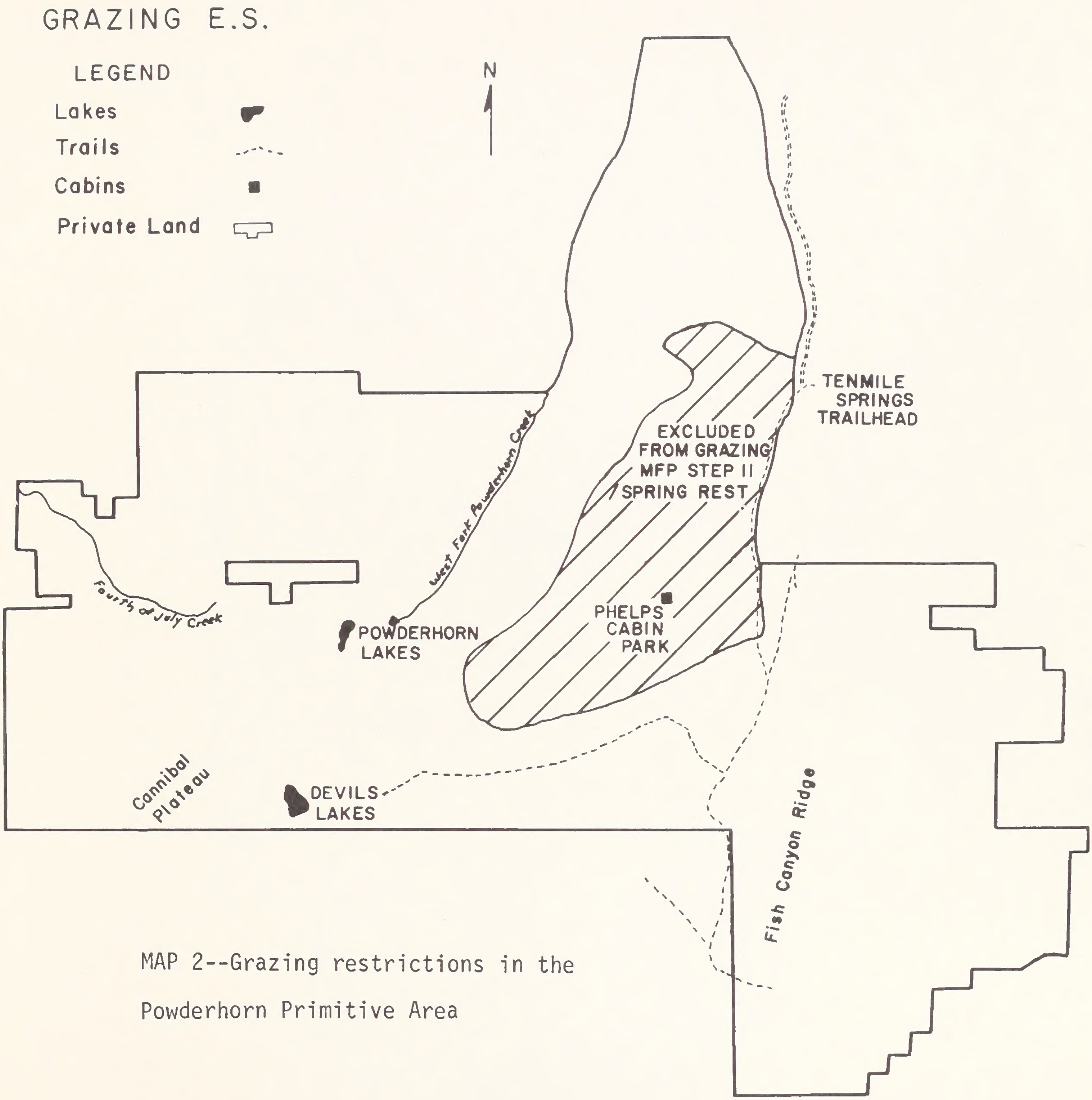
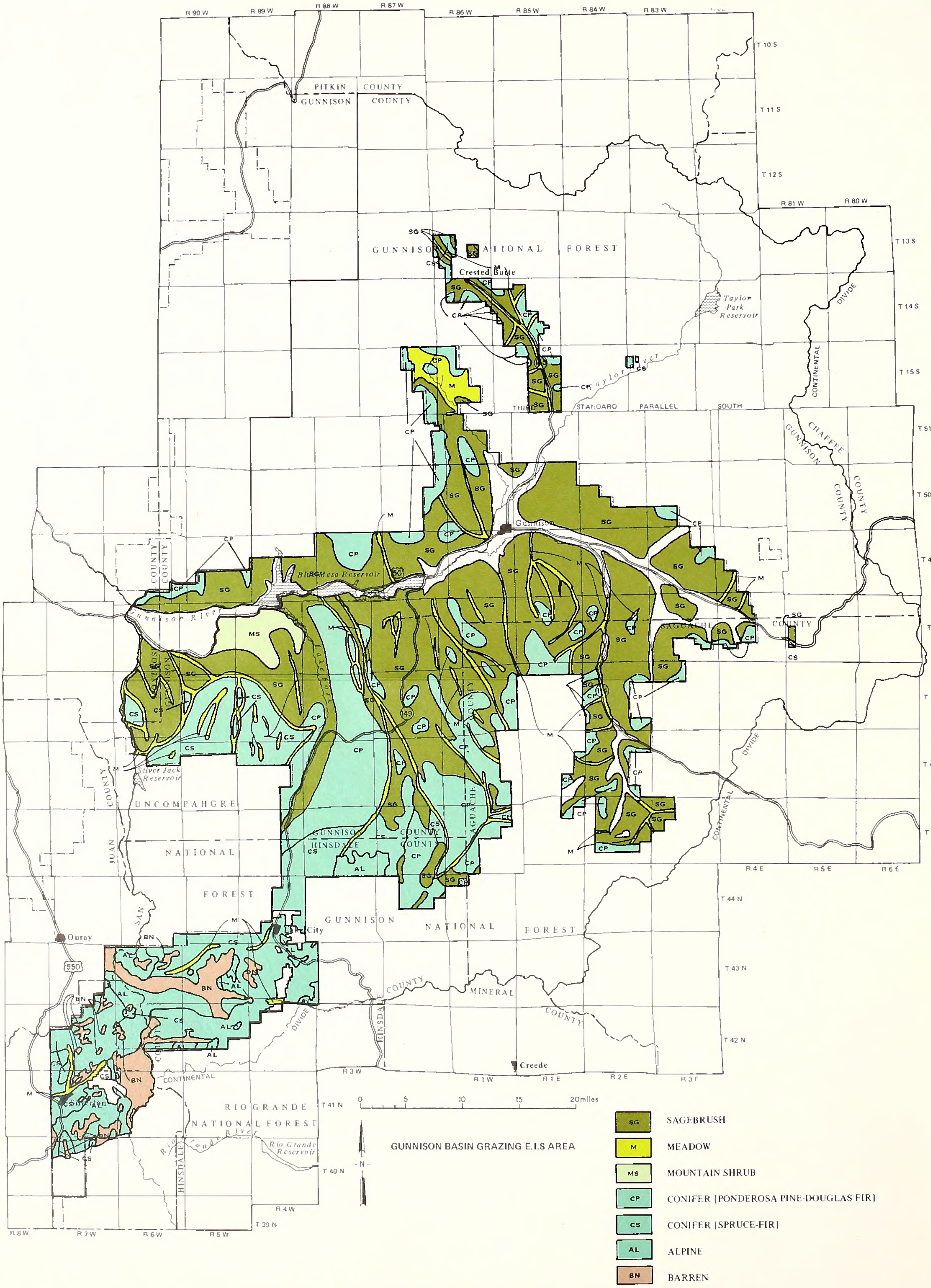
MAPS



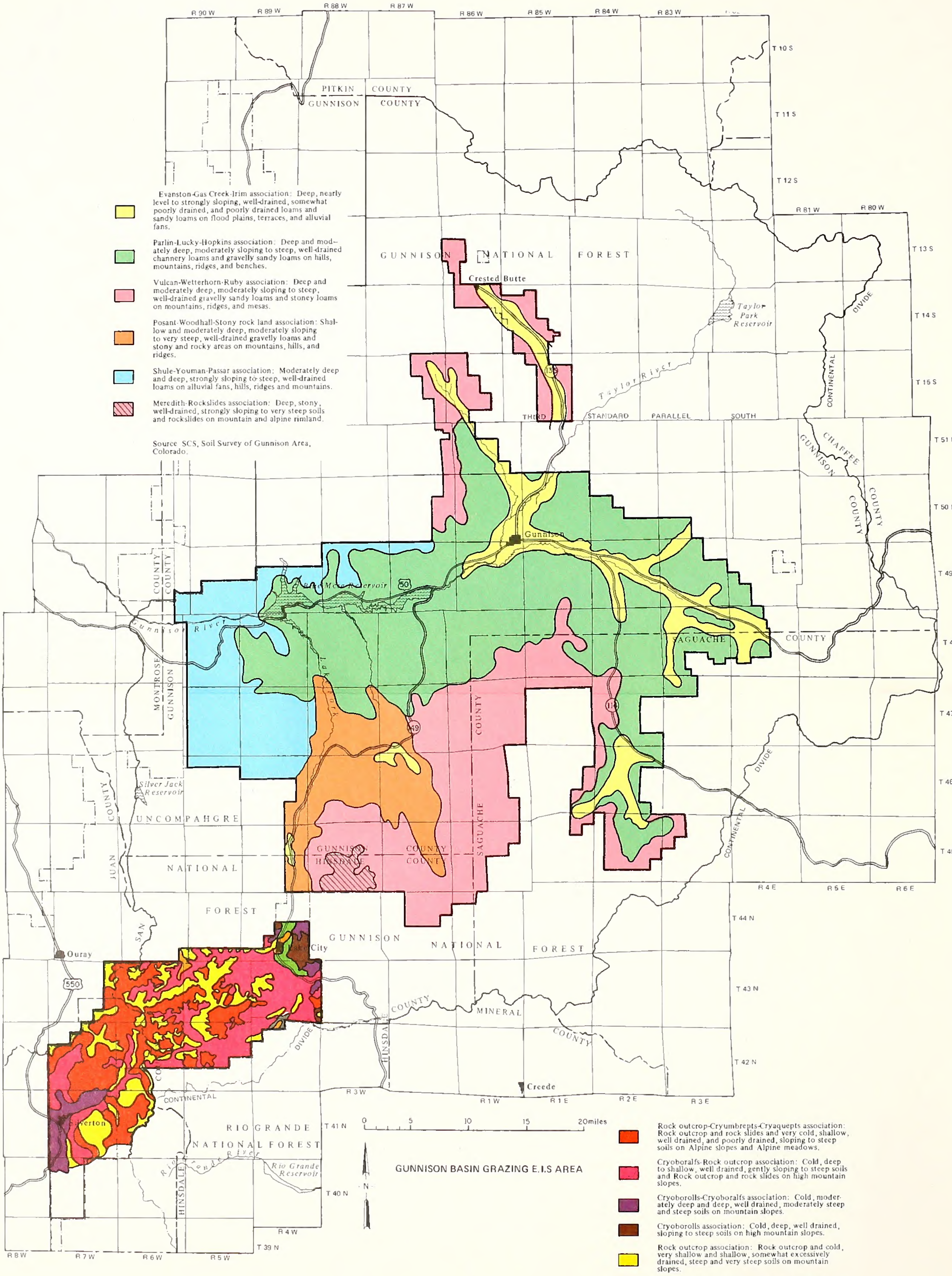
Location map



MAP 2--Grazing restrictions in the Powderhorn Primitive Area



Map 3. Distribution of Vegetative Types



🟨 Evanston-Gas Creek-Irim association: Deep, nearly level to strongly sloping, well-drained, somewhat poorly drained, and poorly drained loams and sandy loams on flood plains, terraces, and alluvial fans.

🟩 Parlin-Lucky-Hopkins association: Deep and moderately deep, moderately sloping to steep, well-drained channery loams and gravelly sandy loams on hills, mountains, ridges, and benches.

🟥 Vulcan-Wetterhorn-Ruby association: Deep and moderately deep, moderately sloping to steep, well-drained gravelly sandy loams and stoney loams on mountains, ridges, and mesas.

🟧 Posant-Woodhall-Stony rock land association: Shallow and moderately deep, moderately sloping to very steep, well-drained gravelly loams and stony and rocky areas on mountains, hills, and ridges.

🟦 Shule-Youman-Passar association: Moderately deep and deep, strongly sloping to steep, well-drained loams on alluvial fans, hills, ridges and mountains.

▨ Meredith-Rockslides association: Deep, stony, well-drained, strongly sloping to very steep soils and rockslides on mountain and alpine rimland.

Source SCS, Soil Survey of Gunnison Area, Colorado.

🟥 Rock outcrop-Cryumbrepts-Cryaquepts association: Rock outcrop and rock slides and very cold, shallow, well drained, and poorly drained, sloping to steep soils on Alpine slopes and Alpine meadows.

🟥 Cryoboralfs-Rock outcrop association: Cold, deep to shallow, well drained, gently sloping to steep soils and Rock outcrop and rock slides on high mountain slopes.

🟪 Cryoborolls-Cryoboralfs association: Cold, moderately deep and deep, well drained, moderately steep and steep soils on mountain slopes.

🟫 Cryoborolls association: Cold, deep, well drained, sloping to steep soils on high mountain slopes.

🟨 Rock outcrop association: Rock outcrop and cold, very shallow and shallow, somewhat excessively drained, steep and very steep soils on mountain slopes.

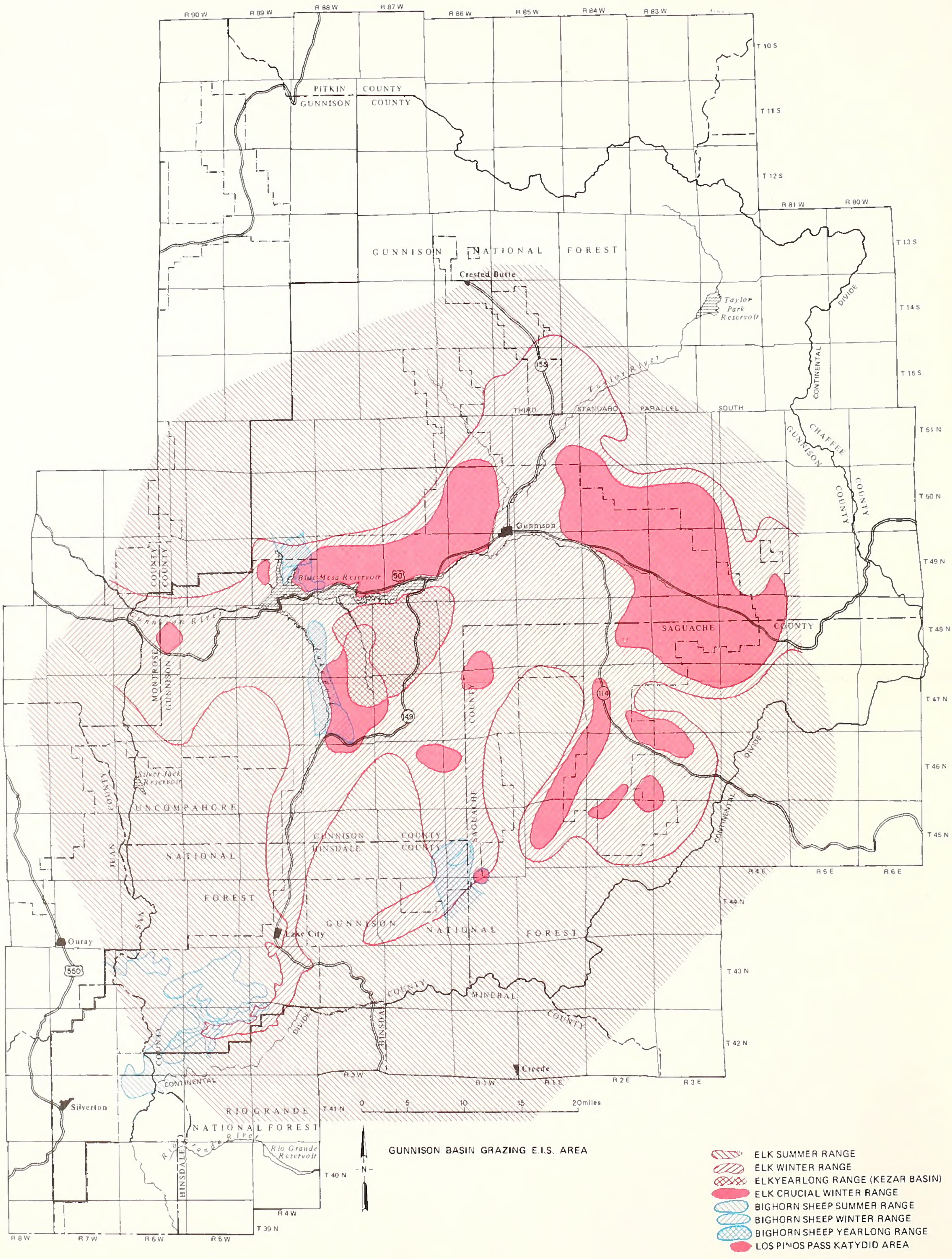
⬛ Cryoborolls-Haploborolls-Cryorthents association: Cold and cool, deep to shallow, well drained, gently sloping to steep soils on benches and mountain slopes.

🟩 Haploborolls-Argiborolls association: Cool, moderately deep and deep, well drained, moderately steep and steep soils on colluvial-alluvial slopes, terraces, and fans.

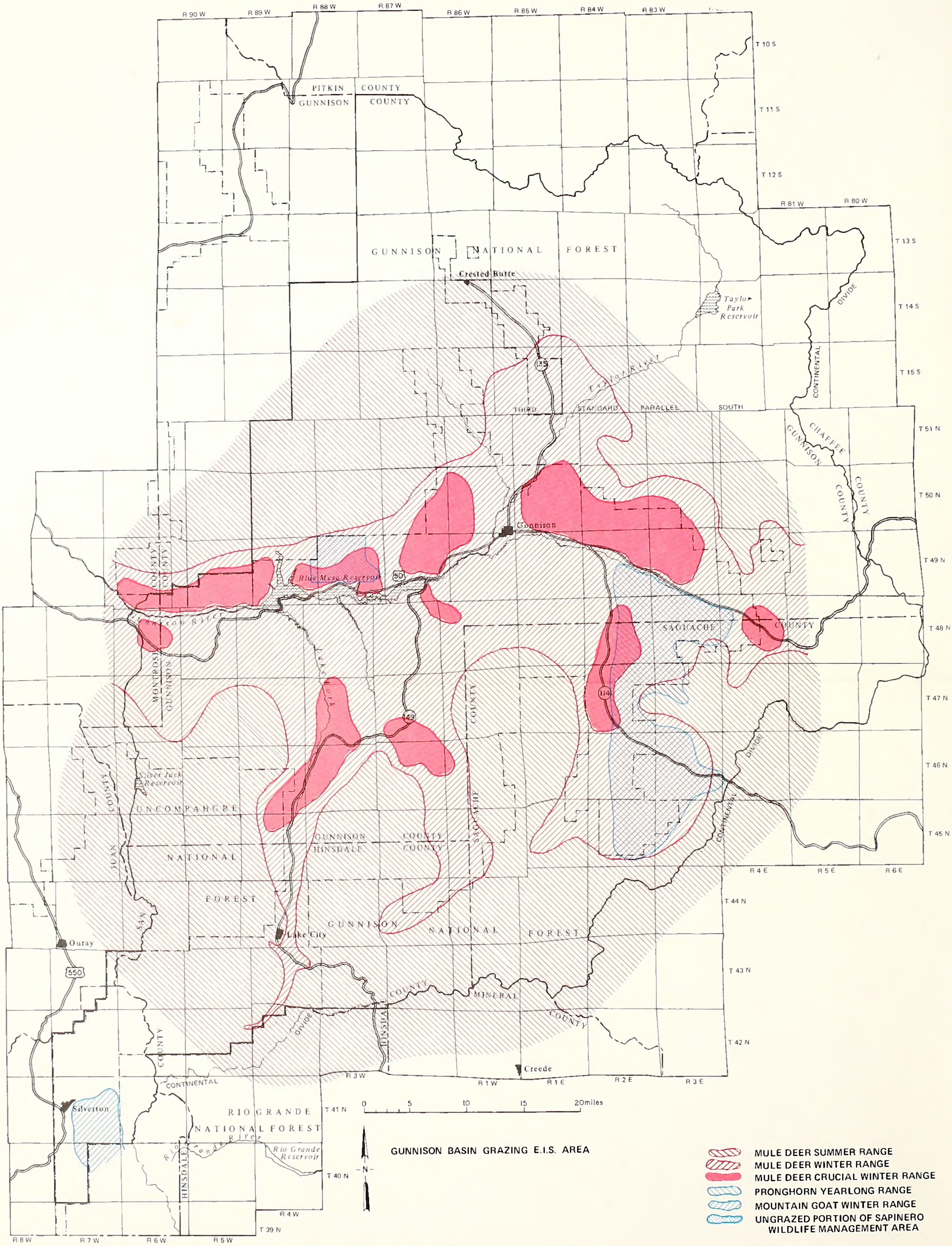
🟧 Cryaquolls assiciation: Cold, deep, somewhat poorly and poorly drained, nearly level soils on flood plains.

Source: SCS, General Soil Maps for Hinsdale and San Juan Counties.

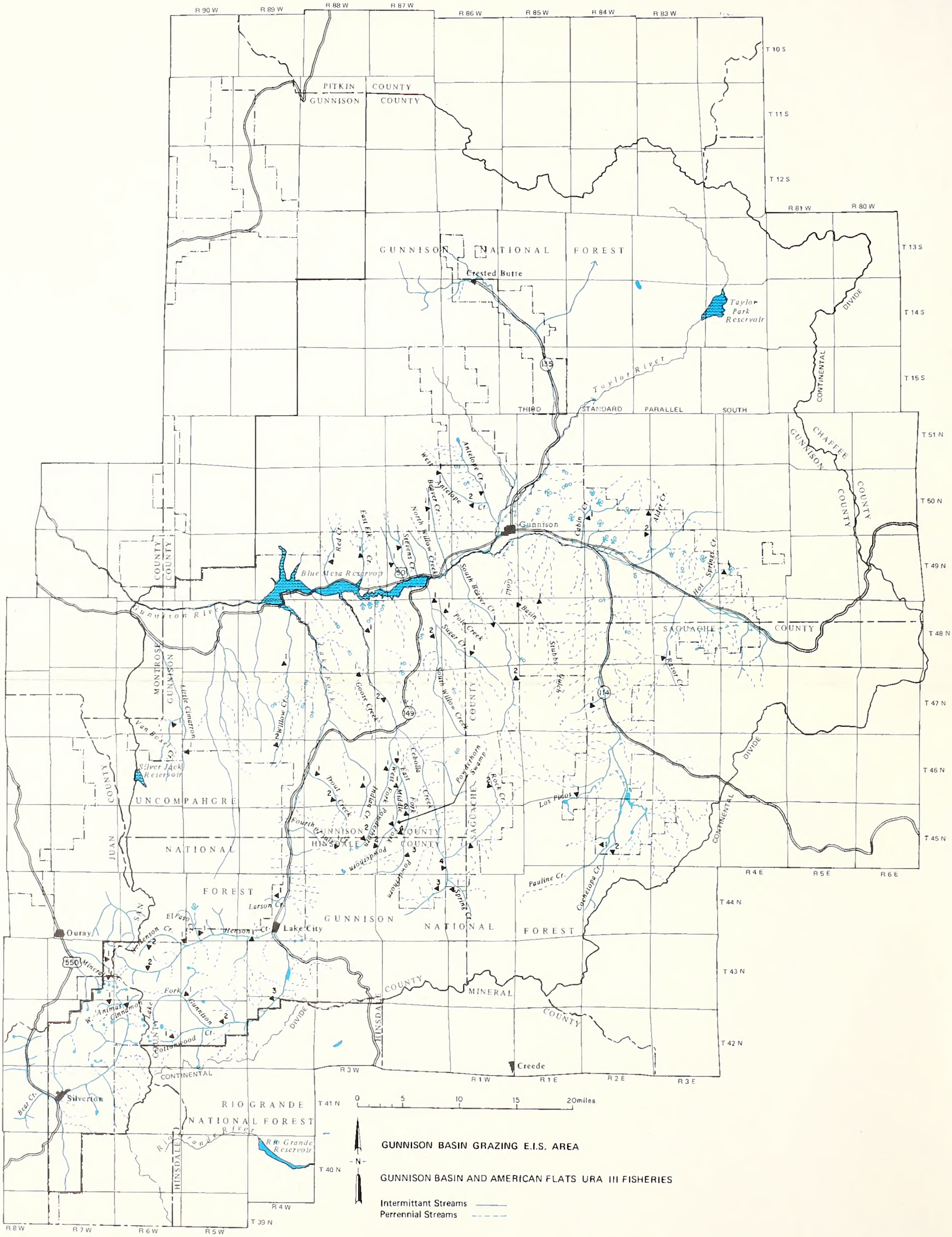
Map 4. General Soil Associations



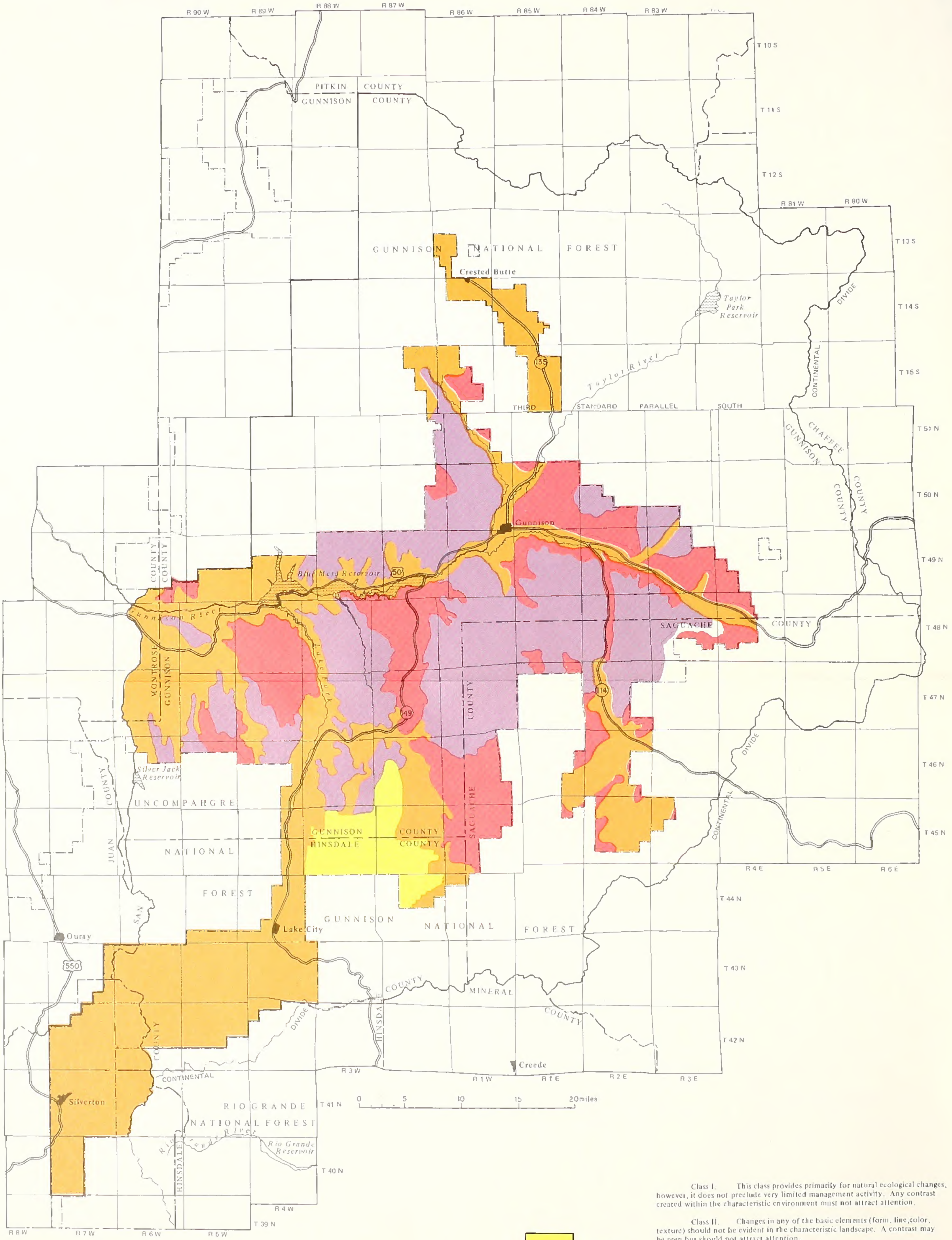
Map 5. Distribution of Wildlife - Elk, Bighorn Sheep, and Katydid



Map 6. Distribution of Wildlife - Mule Deer, Pronghorn Antelope, and Mountain Goat



Map 7. Aquatic and Riparian Habitat



🟨 CLASS I

🟧 CLASS II

🟥 CLASS III

🟪 CLASS IV

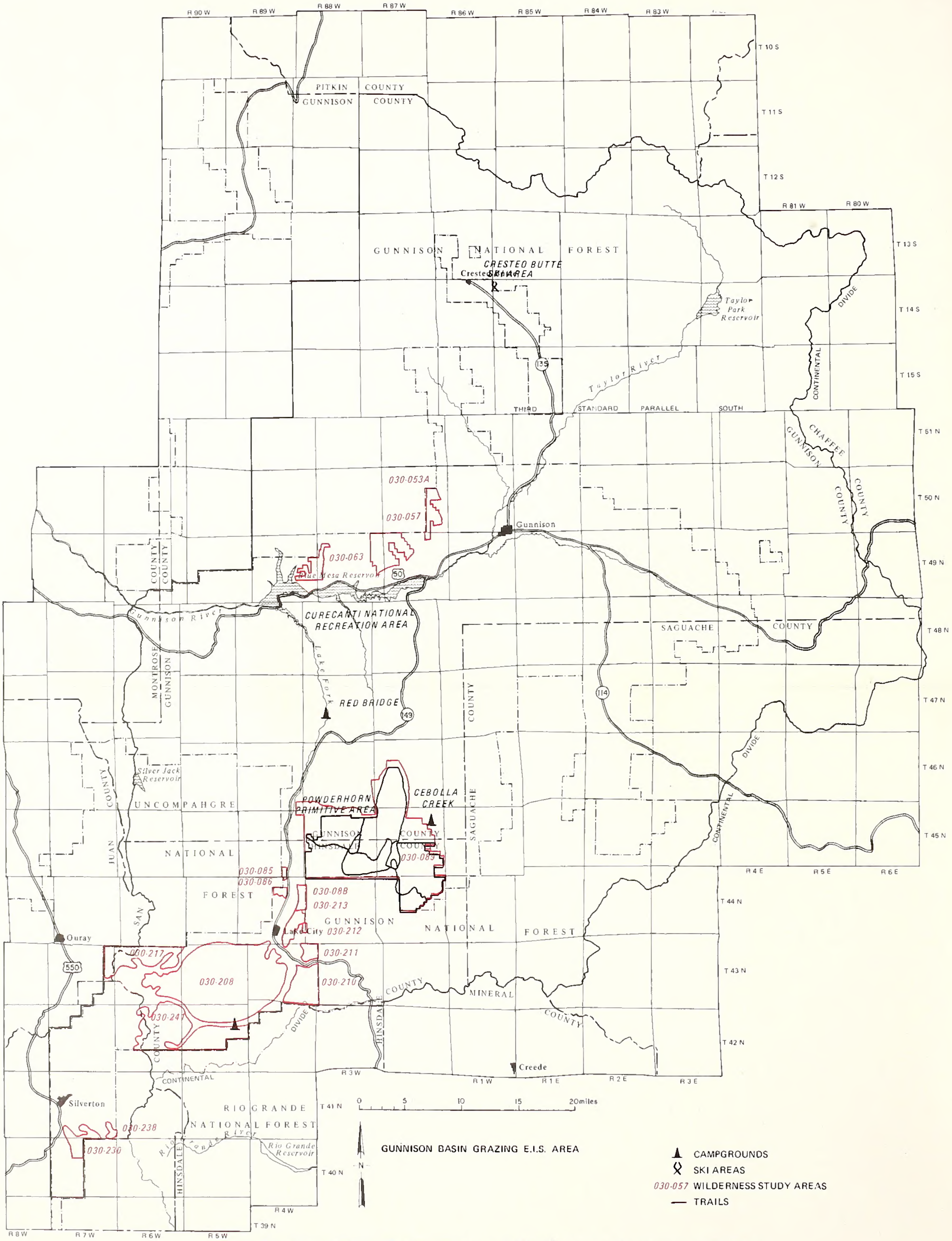
Class I. This class provides primarily for natural ecological changes, however, it does not preclude very limited management activity. Any contrast created within the characteristic environment must not attract attention.

Class II. Changes in any of the basic elements (form, line, color, texture) should not be evident in the characteristic landscape. A contrast may be seen but should not attract attention.

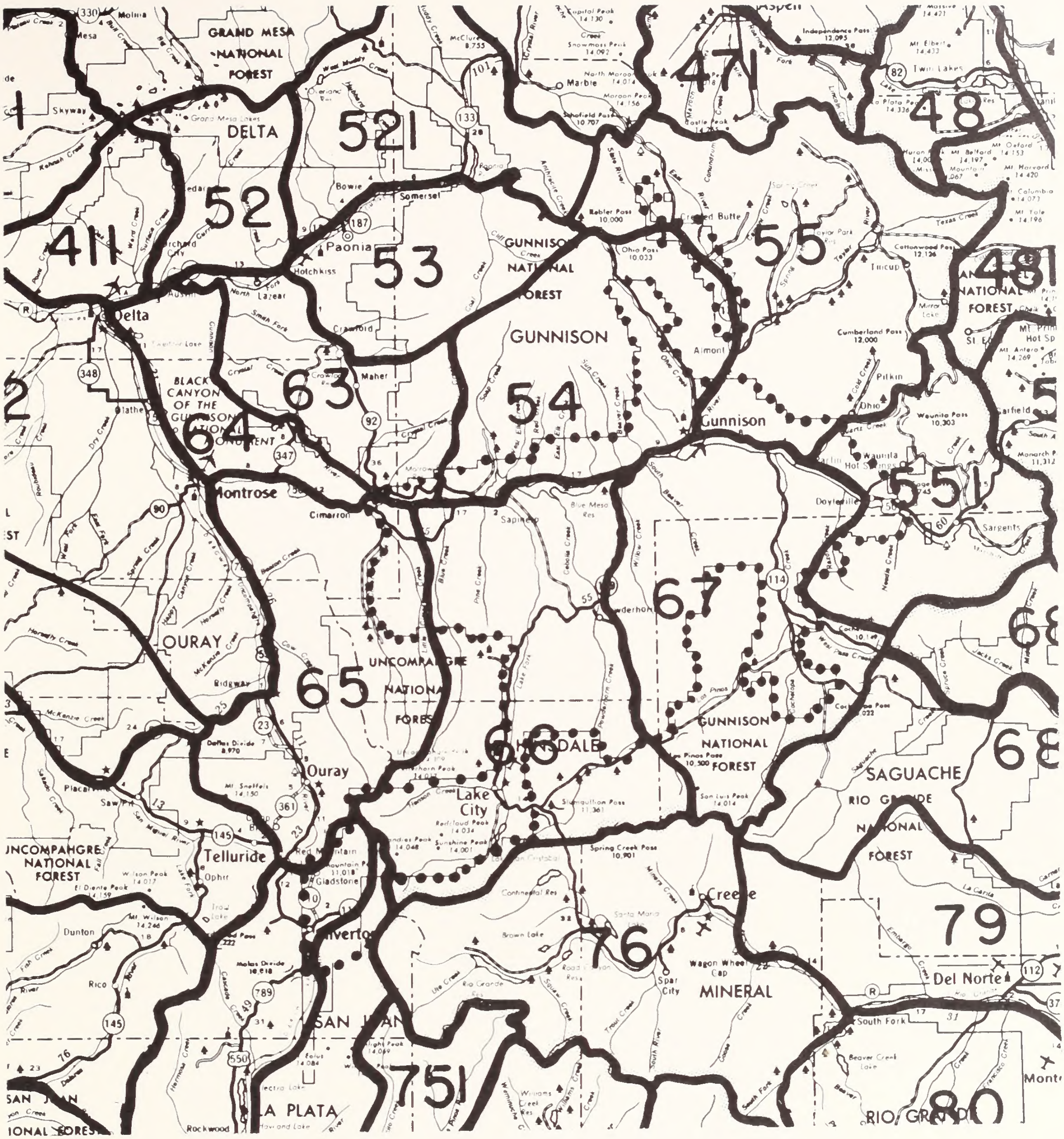
Class III. Contrasts to the basic elements (form, line, color, texture) may be evident and begin to attract attention in the characteristic landscape. However, the changes should remain subordinate to the existing characteristic landscape.

Class IV. Contrasts may attract attention and be a dominant feature of the landscape in terms of scale; however, the change should repeat the basic elements (form, line, color, texture) inherent in the characteristic landscape.

Map 8. Visual Resource Management Classes



Map 9. Recreation Resources and Wilderness Inventory Units



MAP 10

BIG GAME MANAGEMENT UNITS

EIS AREA BOUNDARY ● ● ● ● ●

SOURCE: COLORADO DIVISION OF WILDLIFE

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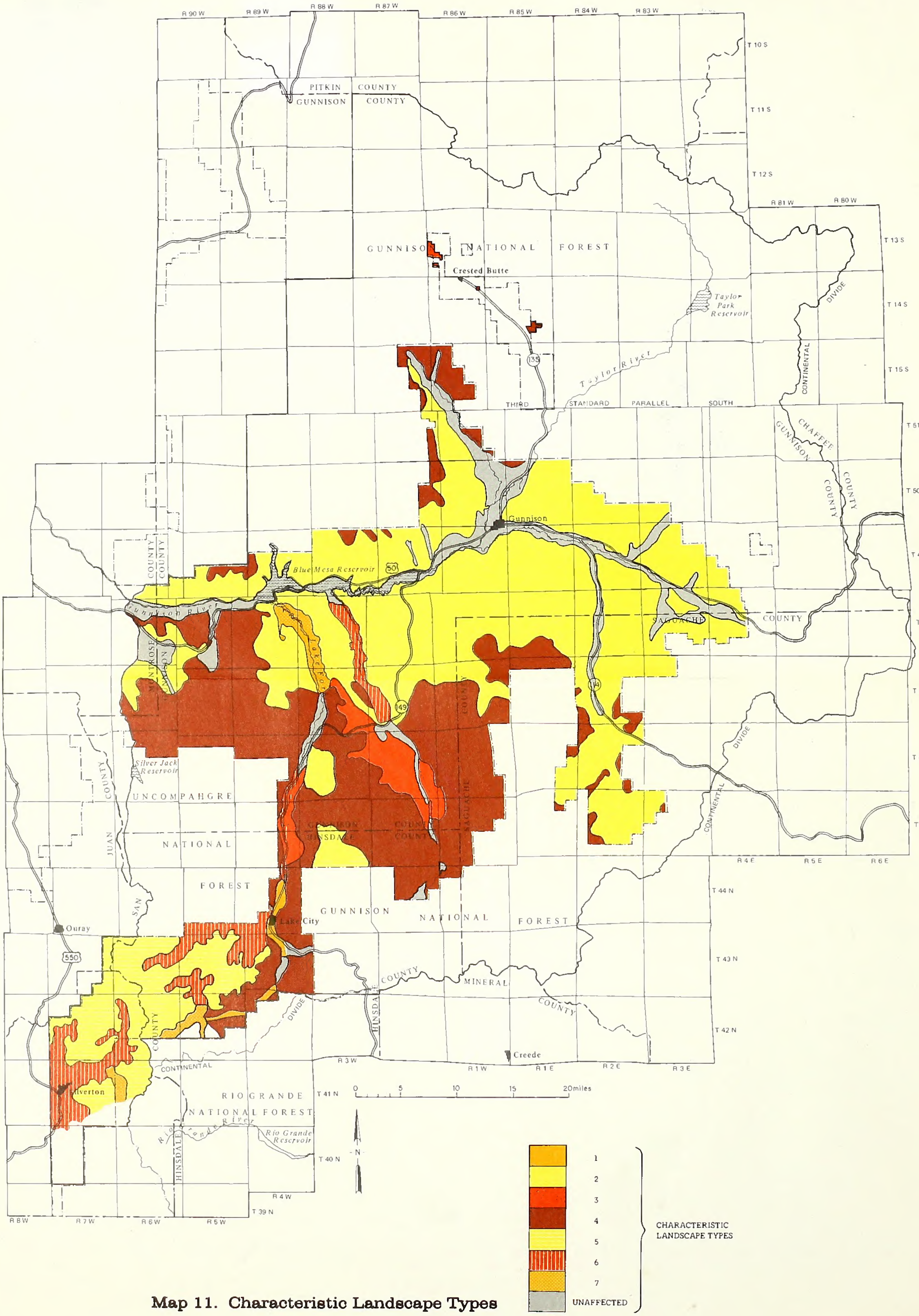

Map 11. Characteristic Landscape Types

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Denver, CO 80225

Form 1279-3
(June 1984)

BORROWE

SF 85.35 .C6 G86
Proposed domestic
grazing manageme

DATE LOANED	BORROWER
3-2288	Keith Tyler 918-7 Tulsa D.O.due:4

USDI – BLM

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R. 92 W.
R. 91 W.
R. 90 W.
R. 89 W.
R. 88 W.
R. 87 W.
R. 86 W.
R. 85 W.
R. 84 W.
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R. 82 W.
R. 81 W.
T. 13 S.
T. 14 S.
T. 15 S.
T. 51 N.
T. 50 N.
T. 49 N.
T. 48 N.
T. 47 N.
R. 8 W.
R. 6 W.
R. 5 W.
R. 4 W.
R. 3 W.
R. 2 W.
R. 1 W.
R. 1 E.
R. 2 E.
R. 3 E.
R. 3½ E.
R. 4 E.
SIXTH PRINCIPAL MERIDIAN
N.M. PRINCIPAL MERIDIAN
STANDARD
PARALLEL
THIRD
SOUTH
TWELFTH
NORTH
GUNNISON NATIONAL FOREST
WEST ELK WILD AREA
WEST ELK MOUNTAINS
Crested Butte
Gunnison
Almont
Pitkin
Paonia
Crawford
Baldwin
MONTROSE
COUNTY
DELTA
SAGUACHE
BLUE MESA RESERVOIR
6401
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6400
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LI
6213
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U.S. DEPARTMENT OF THE INTERIOR, BUREAU OF LAND MANAGEMENT

GUNNISON BASIN LIVESTOCK GRAZING EIS AREA

COLORADO

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Denver, CO 80225

LAND STATUS LEGEND

National Forest	🟩	Bureau of Reclamation	▨
Public Lands	🟨	Power Withdrawals and Classifications	▨
State Lands	🟦	Federal Agency Protective Withdrawals	▨
		Public Water Reserves	▨

SCALE

1 ½ 0 1 2 3 4 5 MI

EIS AREA BOUNDARY

ALLOTMENT BOUNDARY

ALLOTMENT NUMBER

6106
I-INTENSIVE GRAZING MANAGEMENT

6201
LI-LESS INTENSIVE GRAZING MANAGEMENT

PROPOSED SPRING DEVELOPMENT

PROPOSED WELL DEVELOPMENT

PROPOSED STOCK RESERVOIR

PROPOSED FENCE

PROPOSED TRAIL

PROPOSED WATER PIPELINE

AREAS SUITABLE FOR VEGETATION TREATMENTS

CATTLEGUARDS ARE PROPOSED WHERE FENCES WOULD CROSS HEAVILY USED ROADS, HOWEVER, THEY ARE NOT SHOWN DUE TO MAP SCALE.

MAP SYMBOLS

THIS MAP IS PUBLISHED AS A PLANNING AND MANAGEMENT TOOL ONLY. IT HAS BEEN PREPARED WITH THE BEST INFORMATION AVAILABLE. HOWEVER, LAND OWNERSHIP STATUS AND ROAD CONDITION ARE DYNAMIC FACTORS AND CHANGE WITH TIME. THE USER IS CAUTIONED AGAINST USE OF THE OWNERSHIP INFORMATION SHOWN OF A SPECIFIC TRACT OF LAND FOR ANYTHING EXCEPT CASUAL USE TO GIVE A GENERAL LAND PATTERN. ALSO, BECAUSE OF MAP SCALE, SOME FEATURES SUCH AS ROADS, ALLOTMENT BOUNDARIES, AND PROPOSED PROJECT LOCATIONS APPROXIMATIONS.

INTERIOR—GEOLOGICAL SURVEY, RESTON, VIRGINIA—1980
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